THE IMPACT OF NASA'S URBAN COMMUNITY ENRICHMENT PROGRAM ENHANCEMENT WORKSHOPS ON CLASSROOM INSTRUCTION

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1995

Submitted to the Faculty of the
Graduate College of the
Oklahoma State University
in partial fulfillment of
the requirements for
the Degree of
DOCTOR OF EDUCATION
May, 1998

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ENRICHMENT PROGRAM ENHANCEMENT

WORKSHOPS ON CLASSROOM

INSTRUCTION

Thesis Approved:

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ACKNOWLEDGMENTS

The concern of this study has been to investigate the utilization of hands-on activities, curriculum instruction resources and integration of aerospace concepts by educators who have participated in the Urban Community Enrichment Program teacher enhancement workshops from the years 1994 to 1996.

I would like to thank my mother, Lillian Tripp Collins, who has always been with me by encouraging me that "I can do all things through Christ, which strengthens me," Philippians 4:13. In remembering my father, the late Augustus Tripp Jr., who cheered me on in spirit. Thanks to my loving brother, Sergeant Major Rodney Tripp, my sister-in-law Ethel Tripp, and my nephew Brandon Tripp.

I would like to express my sincere appreciation to the following people: My doctoral committee -- Drs. Kenneth E. Wiggins, (Chair), Cecil W. Dugger, Katye Perry, and Steven K Marks. The Oklahoma State University faculty and staff, Dr. Doris Grigsby, Kay Porter, Elizabeth Wilcox, Dr. Stanley Jones, Dr. Ellen Hardwick, Richard Adams, Dr. Joe Martel, Katrina Robinson, Marisa Delci, Kate Ferrell, Jane George, Kevin Durham, Sabrina Andrews-Reddick, David Kopcak, Monica Williams, Leanne Douglas, Antoine Butler, Hector Vasquez, Pamela Christol, and Jodie Rozell.

I am grateful to have a supportive friend, William O. Robertson, who not only understood but helped me through trying times.

A special thanks to the following friends, supporters, and cheerleaders:

Judy Knight

Stephen Biedrycki

Edward Woods

William Young

Gloria and Robert Clarke

Carrie Alexander

Virgina Thomas

Lisa Owens

Daniel Glass

Fronnie Perkins

Susie McIntosh

Leslie Richardson

Dr. Randy Hunt

Rae Martel

Finally, let me thank those whom I will never forget because they had a vision to see the future of UCEP, Dr. Eddie Anderson, Larry Bilbrough, Earl Ginyard, and Sister Clarice Lolich. Lastly, I would like to thank the many participants who were willing to be a part of this study.

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CHAPTER I

INTRODUCTION

In response to a nationwide call for education reform, workshops for teachers have become major avenues to introduce, plan, and furnish unique experiences for teachers in the classroom. Recent educational reform proposals have focused on the use of teacher in-service, staff development, teacher enhancement and teacher workshops to motivate teachers. Many state departments, school districts and government agencies have begun to support teacher workshops. Considerable amounts of time, money, and energy have been invested in in-service education or training (Veenman, & Voeten 1994). Beginning in the late 1970's, in-service education of teachers was not a major concern of most colleges of teacher education (Hite & Howey, 1997). Most of the programs had unclear goals and little continuity, and funds for in-services or training programs were very meager.

What happened to increase the importance of in-service and training education? There seems to be many reasons for this surge of promoting in-service training, the most important being that many groups concerned about professional development were changing their views about in-service and placing more importance on it. For these

groups, teacher education served three main purposes: (1) to stimulate the professional competence and development of teachers, (2) to improve school practice, and (3) to implement politically agreed-upon innovations in schools (Anderson, 1991).

Faculty in colleges of education viewed teacher education as a high priority because of changes in the population of students they taught. There were fewer openings for new teachers, and fewer college students enrolled in teacher preparation programs (Anderson, 1991, p. 54).

However, state departments of education saw in-service as a primary concern because fewer certificates were being awarded and therefore standards for certification had less impact upon the quality of corps of teachers (Anderson, 1991).

For school districts, in-service and training of teachers had always been a priority. There have always been two varieties of in-service needs: (1) new teachers (and some older teachers) need further preparation in basic teaching skills and knowledge, and (2) at some time in their careers, all experienced teachers find it necessary to retrain for new competencies to meet newly identified needs of students (Hite & Howey, 1997).

Taxpayers and legislators were somewhat responsible for increasing the demand for teacher training. Legislators were requiring that teachers be accountable for the performance of their pupils, and this demand translated to new teacher needs (Anderson, 1991).

Teachers' organizations had an impact on in-service education as well. Many organizations had taken strong positions in favor of teachers having a voice in determining their own professional development.

As workshops, training and teacher in-services were designed for teachers, research on teacher practices during the 1970's through the 1990's had yielded important information. Educators increasingly had come to realize that any meaningful improvement in the quality of education that students receive was highly dependent on the quality of instruction that teachers provided (Anderson, 1991). Educational effectiveness depended to a great extent on teacher effectiveness (Anderson, 1991). Many improvements in teaching required that teachers possess substantial amounts of knowledge, skills, or a combination of both. For most teachers, the primary sources of knowledge and skills needed to be effective in the classroom came from: (1) teacher education, and training they received prior to teaching, and (2) the education training they received while on the job, whether in-service, workshops, or staff development. Many teacher behaviors had correlated positively with student achievement (Parkay, 1986). It had been observed that when teachers felt confident about what they had learned in workshops they were more inclined to work harder in presenting information to students (Howard, 1986). Therefore, much emphasis is now focused on professional development of teachers through teacher enhancement workshops (Zumwalt, 1986).

At a national level, the National Aeronautics and Space Administration (NASA) has been at the forefront of the drive to enhance teachers' professional development. The National Aeronautics and Space Act of 1958 charged NASA with the expansion and dissemination of knowledge. Early activities of NASA in education were focused on higher education with regard to work force needs, graduate study, and research. The education reform movement, which had its beginnings in the 1980's, rekindled an interest in education programming within NASA. NASA's education vision was to promote

excellence in America's education system through enhancing and expanding scientific and technological competence (NASA, 1998).

At present NASA conducts a large and diverse set of educational programs that span elementary to postdoctoral levels. These programs have developed over the years, not only in response to the agency's needs, but to national priorities as well. NASA has several core sets of programs in place. Some of these are:

- Aerospace Education Services Program (AESP)
- NASA Education Workshops for Mathematics, Science and Technology Teachers (NEWMAST)
- NASA Education Workshops for Elementary School Teachers (NEWEST)
- Urban Community Enrichment Program (UCEP)

For this study, the researcher will focus on the UCEP program.

The UCEP program was designed as an innovative educational aerospace program for urban and inner city teachers. The program is provided to a diverse set of students representing a variety of cultures. It provides needed skills, with emphasis on enrichment and supplemental instruction to under-represented minorities. Special emphasis is placed on providing teachers with assistance in developing imaginative science instruction, sharing ideas, and helping to devise strong science and educational curricula using a multi-disciplinary approach. The program lasts eight weeks and is staffed by an interdisciplinary team of education specialists.

In 1981, the NASA Educational Affairs Division implemented the first UCEP program in six District of Columbia middle schools as a small exploratory effort. The objectives then were to increase awareness of aerospace careers, to motivate students, and

to provide a supplemental teaching aid for teachers of grades five through eight. The program was successful and subsequently was requested by school districts in Maryland, Indiana, Tennessee, California, Texas, Georgia, Pennsylvania, Illinois, Kentucky, New Jersey, Missouri, Florida, Massachusetts, North Carolina, South Carolina, Louisiana, Alabama, Virginia, Puerto Rico, Ohio, Michigan, Arizona, St. Croix (Virgin Islands), Oklahoma, Kansas, Guam, New York, and Connecticut.

Since its implementation UCEP has serviced more than 39 school systems and over 704 schools, to include approximately 1,348 administrators, 5,582 teachers and 529,603 students from urban areas. However, as the program grew, NASA realized that more professional development and teacher training were needed for UCEP teachers. In recent years, NASA's education division became concerned that they were not adequately meeting the needs of educators after examining the number of teachers participating in teacher enhancement workshops and seeing the numbers were much too low. The program was restructured so teacher enhancement workshops would provide science, mathematics, and technology integration, aerospace concepts integration in the curriculum, activity-based lessons, cooperative learning strategies, leadership skills development, active learner participation, and relevant aerospace field trips.

UCEP sponsors two types of teacher enhancement workshops. Core workshops are conducted during the eight-week program and an additional two-week program is provided during the summer. These workshops provide activities, information, and field experiences that teachers can use in motivating students to improve their reading, writing, and mathematical skills.

The primary mission of UCEP is to disseminate educational information about NASA's programs to students in grades five through eight. UCEP attempts to nurture an interest in the national initiatives in aeronautics, space science and technology through lectures, demonstrations, student involvement, and teacher enhancement workshops. Currently, UCEP conducts nine to ten core teacher workshops each year. These workshops are held during an eight-week period each semester.

The goals of UCEP are:

- Provide urban youth greater exposure to space topics in an interdisciplinary manner;
- Foster direct teacher/parent involvement in the aerospace education process;
- Increase teacher and community awareness of NASA resources and technical assistance programs which can be used as supplements to the existing curriculum;
- Raise awareness of multicultural contributions to aerospace;
- Foster greater student awareness of careers in mathematics; and
- Motivate students to improve their reading, writing, and mathematical skills.

In the summer of 1993, NASA's Education Division instituted a new professional development opportunity for middle school UCEP teachers, the UCEP summer enhancement workshop. This workshop provided teachers hands-on science, mathematics and technology activities, and interaction with aerospace specialists, engineers, scientists, and technicians from a nearby NASA field center. The teachers accepted in the workshop

were selected from core teachers of UCEP workshops held during the previous school year.

Statement of Problem

The NASA UCEP teacher enhancement workshops are designed to offer teachers an opportunity to update their knowledge, experience hands-on aerospace activities, and develop interdisciplinary curriculum strategies. There are three workshop categories, defined in the following manner. Category I is the NASA UCEP Core Teacher Enhancement workshop. Category II is the NASA UCEP Summer Teacher Enhancement workshop. Category III includes both the NASA UCEP Core Teacher Workshop, and the NASA UCEP Summer Teacher Enhancement workshop. In the past, surveys were given to assess the effectiveness of these workshops. At present, it is not known how participants utilized aerospace concepts, subject matter, and instructional delivery of curriculum strategies. The general problem is: How have UCEP participants from the years of 1994 through 1996 made use of hands-on aerospace activities, developed curriculum strategies, and integrated interdisciplinary products learned from participation in the UCEP workshops?

Purpose of the Study

The purpose of this study was to determine if NASA UCEP teacher enhancement workshop participants utilize hands-on activities, curriculum instruction, resources, and integration of aerospace concepts, and if the impact on their classroom instruction varies

after attending only the UCEP summer enhancement workshop, the core workshop, or both the summer and core workshops.

Research Questions

The researcher will seek to gather data to answer the following questions:

1. What are the background characteristics of Category I, II, and III workshop participants in terms of their gender, current teaching level, primary position in school, number of years of teaching experience, highest degree earned, type of school in which they teach, number of students in the school, average number of students per class, educational classroom staffing and teacher participation in previous aerospace workshops?

2. How often have Category I, II, and III workshop participants incorporated the use of NASA curriculum products in their classroom?

3. How often have Category I, II, and III workshop participants incorporated the use of hands-on activities in their classroom?

4. How have Category I, II, and III workshop participants integrated aerospace curriculum material and concepts in their classroom?

5. How have Category I, II, and III workshop participant shared their workshop experience with others?

6. How have Category I, II, and III workshop participants worked with teachers of other disciplines to plan and prepare interdisciplinary lessons?

7. How have Category I, II, and III workshop participants made use of aerospace curriculum enhancement products?

8. Do Category I, II, and III workshop participants differ in their responses to research questions two through seven?

Definition of Terms

In this study the following definitions are used:

AESP: Aerospace Education Service Program, an educational outreach program contracted by NASA to enhance teacher training in the United States. Oklahoma State University is currently the contractor for AESP.

UCEP: Urban Community Enrichment Program, an education program sponsored by NASA. The program is part of the AESP. Education specialists provide the UCEP program to the United States, the Commonwealth of Puerto Rico, and the U.S. Virgin Islands.

Workshop: Educational program for a group that focuses on techniques and skills in a particular field.

Category I: UCEP teachers who attend only the core workshop.

Category II: UCEP teachers who attend only summer enhancement workshops.

Category III: UCEP teachers who attend both the core and summer enhancement workshops.

Aerospace Education: Aerospace education is that branch of general education concerned with communicating knowledge, skills, and attitude about aerospace activities and the total impact of air and space vehicles upon society (Romero, 1973). It must be distinguished from those branches of special education known as aeronautical and/or astronomical which are concerned with training specialized aerospace workers.

Core Teacher: Teachers participating in UCEP teacher workshops who demonstrate continuous growth and professional involvement in the art of teaching. They show successful experience reaching students who need additional educational resources of innovative approaches and intervention strategies to learning. The core teacher will train other teachers to incorporate aerospace concepts in the classroom.

Enhancement Programs: A term for programs that heighten, increase or improve teaching services and experiences of teaching professionals.

Professional Development: An activity or endeavor that provides an opportunity for the professional growth of teachers (Jones, 1996).

In-service: Experiences which are designed to improve the performance of teachers in their assigned responsibilities (Hite, 1997).

Significance of the Study

Information gained from this study will benefit future core and summer enhancement programs by providing teachers relevant instruction. The nature of these workshops dictates continuous evaluation so future enhancement workshops will enable core teachers to meet the objectives of NASA and aerospace education.

Assumptions

The assumptions of this research imply the following:

- The questionnaire used is a valid method of collecting data for determining differences in classroom practices of core teachers.
- Questions that are asked will be suitable for data interpretation.

- Core teachers who are interviewed in the study do so voluntarily.
- The core teachers respond honestly to the questionnaire with the assurance of confidentiality.

Limitations

The limitations of this study are: (1) voluntary participation of the participants, (2) the researcher will use interview techniques based upon available methodologies and current research, and (3) only participants in the 1994, 1995, and 1996 UCEP workshops are included in the study. Therefore, delayed recall becomes a limitation of this study.

Summary and Organization Of the Study

Chapter I presents the nature and statement of the problem, the need for the study, purpose of the study, research questions, definitions of terms, and outlines the assumptions and limitations of the study. Chapter II sets the foundation of the study by presenting a review of relevant literature on teacher workshops with emphasis on enhancement programs. Chapter III relates the methodology and design of the study. Chapter IV presents the analyses of the data collected in the study. Chapter V includes the summary of the study, findings, conclusions, and recommendations.

CHAPTER II

REVIEW OF LITERATURE

Introduction

This chapter includes a review of literature focusing on the related problem. The review of literature addresses the following areas:

1. History and development of workshops
2. Teacher enhancement programs
3. NASA's involvement in education and the UCEP enhancement workshop
4. Selected aerospace studies

History and Development of Workshops

In the summer of 1936, a six-week seminar was held with thirty teachers. These thirty teachers were part of two commissions, the commission of the Reorganization of the Secondary School Curriculum and the Commission on the Relation to School and College of the Progressive Education Association. The seminar was held at Ohio State University to discuss the curriculum and evaluation of secondary school materials. Research from this meeting proved so successful that in 1937 the idea of the seminar became known as a "workshop" (Ryan, and Tyler, 1939). The 1937 workshop was held at Sarah Lawrence

College, Bronxville, New York. Because of the success of the Sarah Lawrence Workshop of 1937, a new idea of in-service education for teachers was born.

These workshops were the foundation for other workshops to come. In 1938 two new workshops were introduced, the Rocky Mountain Workshop and the Eastern Workshop. The Rocky Mountain Workshop was held at Colorado Women's College in Denver, Colorado and the latter was held at Mills College in Oakland, California. The reason for the workshop sites was teachers could work directly with groups who shared similar concerns, especially in the areas of curriculum and evaluation (Ryan & Tyler, 1939).

The above mentioned workshops were markedly different from most of the in-service programs of the past. These worked because they carried out certain fundamental principals that had been neglected in American education (Ryan & Tyler, 1939).

These principles are captured as follows:

1. Concern for the needs of individual human beings in direct relation to the demands of the community;
2. Insistence upon a rich experience of living as essential to all education; and
3. A scientific approach to the understanding of human beings and society that makes full use of modern instruments of evaluation. (Ryan & Tyler, 1939)

The early educational workshops were general in nature. However, by 1957, workshops were designed to provide the following:

- An opportunity to make an intensive study of an interest that has arisen out of the experience of a teacher;
- A planning session of individual and group activities designed to meet needs of fellow workers;
- An access to the services of staff members, representing a variety of kinds of assistance;
- A formal and informal association with participants of varied backgrounds making a contribution to specific problems, professional orientation, and an opportunity for experiences in cooperative activity;
- An effort to interest the teacher in studying the whole child, the whole school, and the whole community;
- A total experience for the teacher to study a specific interest or problem; and
- Concerned not only with the professional problem of the teacher, but with the life of the individual (O'Rourke & Burton, 1957, pp. 8-9).

A workshop was said *not* to focus on the following:

- A series of lectures nor a series of meetings, symposium, a conference nor an institute.
- A device of orientation for a new teacher.
- A device for teaching subject matter more easily.
- A place for listening and absorbing subject matter.
- A research situation, although a good deal of research technique may be involved (O'Rourke & Burton, 1957, pp. 9-10).

Workshops were devoted to individual and group problems. The significance of the workshop was to make it pertinent to the teachers' needs and insure that the individual participants carried the information learned in the workshop back to the classroom and the community.

By 1941, the workshop model was being used for teacher training purposes. The Michigan Community Health Project, sponsored by the Kellogg Foundation, organized a series of workshops to help teachers use their community resources to improve the scope of their teaching (Chambers, 1989). These workshops included health education, science education, social science, library science, language arts, and citizenship. They were structured very much like the workshops of the 1930s.

The workshops continued to grow and their popularity and usefulness were viewed as important for teacher in-service. As workshops grew their purposes changed. Kelley, in 1951, defined the purposes of workshops as: (1) an atmosphere where teachers could readily communicate, (2) an opportunity for personal growth through accepting and working toward a goal held in common with others, (3) an opportunity to work on problems that are direct and of a current concern, (4) a place where teachers are in a position of responsibility for their own learning, (5) an experience in cooperative undertaking, (6) a place where teachers can learn methods and techniques which they can use in their own classrooms, (7) a place where teachers have an opportunity in collaboration with others to produce materials that will be useful in their teaching, (8) a place where teachers can evaluate their own efforts, and (9) a place that gives teachers an opportunity to improve their own morale (p.11).

From the early inception of workshops one can see how their structure changed as organization of the workshop changed. A general description of a functional workshop in 1966 is given below:

> Though 'workshop' is a term used in a great variety of ways, it denotes one common thread of concern: to translate theory into practice. During recent years, the workshop has grown increasingly important as an in-service educational

> arrangement to help teachers refine local educational objectives in the perspective of emerging national programs. Too many workshops, however, because they are unstructured, turn out to be little more than academic study groups. If a workshop is to be what it purports to be, namely a 'workshop,' it needs to be carefully structured in the act of 'doing' rather that the act of 'listening'. In other words, a purposeful workshop is an activity, an activity having it's beginning in the recognition of a problem and in the decision to allocate a solution, or at least in forming resources, for that problem (Harris, 1969, p.13).

In the 1980's, the term workshop could be used interchangeably with in-service, staff development, and teacher enhancement. All three are a means of accomplishing the same goals. In-service education is planned opportunities for teachers to improve their performance in their assigned responsibilities (Gersten, Woodard, & Morvant, 1992). Staff development, as defined by Ross and Regan (1993), are changes in understandings, affects and actions that increase effectiveness in a role. Teacher enhancement is to improve, broaden, and deepen the disciplinary and pedagogical knowledge of elementary and secondary teachers (Frechtling, Sharp, Carey, & Vade-Kiernan, 1995).

The development of the educational workshop was a response to teachers in the public schools to improve the curriculum and instruction as partial solutions to the problems of their communities. The early educational workshops were general in nature in order to describe and define the problem-solving techniques used by the individual participants. The rationale that described the problem-solving techniques was significant in defining the basic characteristics of the educational workshop (Marks, 1975)

Teacher Enhancement Programs

Teacher enhancement programs of today can be described as workshops that seek to improve, broaden, and deepen the interdisciplinary and pedagogical knowledge of

elementary and secondary teachers. In the past, the idea of working with teachers had usually been addressed by educators through the mechanism of in-service training. In-service training was usually offered to teachers by educators as a one-time opportunity (either a half day, full day, or one or two week summer course). However, these were known to have little effect on what actually happened in the classroom (Parkay, 1986). In-services often concentrated on the teaching process, rather than on the learning process.

The term "teacher enhancement" as used in the 1990's is similar to the term "school reform." It is a single label that covers a wide variety of services and experiences offered to teaching professionals (Frechtling, Sharp, Carey, & Vaden-Kiernan, 1995). Today's teacher enhancement programs can be described in terms of two general dimensions: their focus and their structure (Frechtling, et al, 1995, p.14).

Focus has been used to mean "the content of the teacher enhancement program or what types of knowledge and skills are being taught" (Frechtling, et al, 1995. p.15). There have been many arguments over focus, especially the question of how much weight to place on content versus the process of instruction. Today, as in the past, these factors are given differing priority, based on what group is offering the program and the gap the program is designed to fill. Programs stressing content view the role of teacher enhancement as providing a higher level of knowledge in a particular area. Advocates of process stress the need to reform the teaching-learning interactions, emphasizing the importance of the constructivist approach. These programs provide the teacher with skills to use hands-on, inquiry-based instruction and to be a facilitator rather than a lecturer.

Structure has been used to mean the approach to planning and delivery of the enhancement programs. Two schools of thought coexist today with regard to structure of teacher enhancement programs (Lieberman, 1995). These schools of thought can be contrasted in terms of expert-driven experiences and teacher-driven experiences. The expert-driven experiences are directed by experts who share their knowledge, work environment, and work experiences with teachers (Lieberman, 1995). Lieberman characterizes this method as the conventional approach, which defines staff development as "a transferable package of knowledge to be distributed to the teacher in bite-sized pieces" (Lieberman, 1995, p.592).

The teacher-driven experiences often aim at changing cultures as well as gaining new knowledge. They tend to be long in duration and embed the development of activities in a school setting. Proponents of the teacher-driven approach see schools as learning organizations and believe real change requires collective problem solving, practice, and creating a culture of inquiry (Lieberman, 1995).

In addition to the philosophy of the above approaches there are characteristics that may be included; intensity, target population, and geographic scope. Intensity involves professional development activities that range from short, single-event experiences to multi-year programs. Some teacher enhancement programs are short-term workshops or in-service days in which a particular technique is explained or a new policy introduced. Other summer workshops or mentorships are several weeks in duration. Target populations are programs that target individual participants versus teams of participants from a single school or site. Geographic scope are programs that targeted at the local, regional, or national level. Teacher-directed programs are almost always local, while

those based on the expert model can be local, regional or national in scope (Lieberman, 1995).

Enhancement programs vary in terms of goals, especially the extent to which the teacher rather than the student is the primary target of program impact (Meserve, 1989). Potential goals of teacher enhancement programs are as follows:

- Increasing teacher knowledge...one reason for the need to increase teacher knowledge is that mathematics and science teachers, especially those who teach elementary students, often receive inadequate preparation in the subject area during their undergraduate education. Another reason for increasing teacher knowledge is that teachers are expected to be knowledgeable and capable in areas they may not have dealt with as undergraduates, such as computers, environmental issues, and new technologies (Meserve, 1989).

- Providing teacher renewal and the opportunity for networking...although many teacher enhancement programs do not cite networking as a goal, many stress teacher renewal and have networking components. Through networking, teachers have the opportunity to learn about new developments in their field, to keep up with other program participants and mentors, and to share experiences.

- Increasing leadership and empowerment...teacher leaders are very useful in reaching out to and teaching other teachers. Enhancement programs that develop teacher leaders can indirectly reach many more teachers when teacher leaders share their knowledge with others (Sharvelson, 1994).

- Changing classroom practice...most programs help teachers apply what they have learned in the workshop to the classroom, for example, by giving teachers materials

or equipment for classroom activities or having teachers write detailed plans for how they intend to use what they have learned in the classroom. Other programs allow teachers to field test what they have learned with students in the program and/or give teachers coaching or feedback in the use of new instructional tools or materials in the classroom.

• Increasing student interest and achievement...one of the underlying goals of programs, especially in mathematics and science, is to increase students interest and improvement in these areas. Through the use of improved curricula and improved teacher knowledge and teaching methods it is expected that students will benefit from these improvements .

• Enhancing minority participation... since many programs are interested in attracting students who are members of groups that do not usually pursue careers in science or mathematics, some teacher enhancement programs have required teachers who are part of minority groups be involved, while others have developed models for in-service that are particularly encouraging to the development of leaders among under-represented groups. It is thought that teacher leaders from under-represented groups will encourage students from these same groups to become more interested in mathematics and science (Sharvelson, 1995).

Much focus is being placed on enhancement programs by federal agencies. Many of the federal agencies' interest has increased as they look for ways to demonstrate their contribution to the federal education agenda. The major contributors include the Department of Education (DOE), the National Science Foundation (NSF), the National Aeronautics and Space Administration (NASA), and the Department of Energy (DoE)

The programs provided by these agencies are both expert-driven and teacher-driven models. However, the mission agencies rely more on expert-driven models and tend to capitalize more on their own talents, while the Department of Education and NSF are more teacher-driven.

The Department of Education supports the largest teacher enhancement and preparation effort. Over half of the federal budget for teacher enhancement is provided by DOE, primarily through the Eisenhower State Mathematics and Science Program (Committee on Education and Human Resources, 1993). The Department of Education views professional development as a key factor in education reform.

According to the Department of Education's Draft Mission Statement (October, 1994), in reference to teacher enhancement, high quality professional development:

focuses on teachers as central to school reform.

- respects and nurtures the intellectual capacity of teachers and others in the school community.
- reflects best available research and practice in teaching, learning, and leadership.
- is planned principally by those who will participate in such development.
- enables teachers to develop expertise in content, pedagogy, and other essential elements in teaching to high standards.
- enhances leadership capacity among teachers, principals, and others.
- requires ample time and other resources to enable educators to develop their individual capacity and to learn and work together.

- promotes commitment to continuous inquiry and improvement embedded in the daily life of schools.
- is driven by a coherent long-term plan that incorporates professional development as essential among a broad set of strategies to improve teaching and learning.
- is evaluated on the basis of its impact on teacher effectiveness, student learning, leadership, and the school community, and uses this assessment to guide subsequent professional development effort.

The National Science Foundation supports teacher education through two principal means -- its teacher enhancement (TE) and systemic reform efforts. The goal of the teacher enhancement program follows the definition of the term "teacher enhancement." The vision for all projects that fall under the TE includes the following:

- recognition of the critical role outstanding teachers play in promoting competence, interest, and enthusiasm for study in these fields.
- The need for school counselors, parents, community leaders, and others to provide a supportive environment.
- The requirement that school administrators and educational leaders commit themselves and the resources they control to ensuring excellence in education for all students (Abt Associates, Inc., 1993).

The TE program is designed to involve a whole school, school district, group, district, area, or constituency in which schools are connected by a shared need or decision making process.

The National Aeronautics and Space Administration (NASA) programs will be discussed in more detail in the third section of the review of literature.

The Department of Energy is a relatively recent player in teacher development (Raizen & Loucks-Horsley, 1994). In response to a 1989 planning conference on problems of poor education, as highlighted in "A Nation at Risk," the DoE began new initiatives and increased its funding to precollege programs in math and science.

DoE established two major goals in its effort to improve mathematics and science education:

- Arm teachers with a better grasp of subject matter and more effective strategies for teaching science and mathematics through teacher enhancement programs.
- Improve student outcomes, particularly their achievement and persistence in pursuing technical fields (Raizen & Loucks-Horsley, 1994).

DoE strives to focus on the unique resources of its laboratories to obtain these goals. Through its laboratories, DoE offers two types of teacher enhancement programs: teacher development programs and teacher researcher programs. Teacher development programs provide a variety of experiences for teachers in the region of each participating laboratory. These programs usually last two to four weeks and serve approximately 30 participants per session. These programs introduce new content area and support teachers in developing ways to transfer and apply their new knowledge to their classroom. The teacher research programs aim more at providing participants with a research experience and close mentoring by a laboratory scientist (Vivio &Stevenson, 1992). These programs are long term and require the teacher to go back to their home schools and share what

they have learned with their colleagues and students. These programs are sponsored in the summer and last eight weeks.

Foundations are major players in the teacher enhancement area. Many projects from the foundations are targeted at local school districts or regions that have been supported through foundation money. Foundations active in teacher enhancement include the Woodrow Wilson Fellowship Foundation, the Pew Charitable Trust, and the Ford Foundation. Like the federal agencies, goals for the foundations range from a variety of teacher outcomes to impacts on student learning.

Corporate initiatives in science and mathematics take many different forms, from short term support for conference attendance, to providing technical advice and assistance, to supporting more broad-based training (Rigden, 1994). Teachers learn about business or industry firsthand by spending time on job sites with mentors. Many of these enhancement programs aim at another kind of student outcome; helping teachers prepare students to be good workers and scientifically literate citizens.

The Georgia Industrial Fellowships for Teachers (GIFT) were designed for teachers to gain new experience with new technologies and research. The program, initiated in 1990, includes paid summer work or research internship opportunities, in addition to workshops during the summer and school year. An offshoot of GIFT, MINI-GIFT, is for middle grade teachers and involves work or research and the development of educational materials in informal science education settings such as zoos and museums.

Another example of corporate involvement in teacher enhancement in an applied setting is Industry Initiatives for Science and Math Education (IISME), a non profit organization that seeks to improve mathematics and science education in the San

Francisco Bay Area. The goals of IISME are to increase the nation's scientific and technical talent pool, improve the quality of mathematics and science education for all students, and promote mathematics and science literacy in the population at large (IISME Shaping the Future, 1995).

The core program of IISME is the Summer Fellowship Program for middle and high school teachers. These fellowships allow teachers to work for eight weeks in industries, government agencies, and university research laboratories.

Teacher enhancement programs provide substantial support for the benefit of professional development programs, at least where goals such as new knowledge, renewal, and professional leadership are concerned.

Research shows teacher enhancement programs have yielded the following outcomes:

- Participants overall seem satisfied with the training.
- Participants acquired new knowledge and teaching skills.
- New skills were transferred to classroom practice.
- The experience had a positive impact of feelings of professional renewal and career satisfaction.
- Teachers seem to feel more empowered and able to take on leadership in their home schools and to act as disseminators of information.
- Student attitudes toward math and science have improved, but more research is needed on student achievements in these areas as a result of teacher participation in enhancement programs (Weiss, 1990).

NASA's Education Programs and the UCEP Enhancement Workshop

In the 1990's, America is faced with reforming education. To maintain a leadership role, the National Aeronautics and Space Administration (NASA) is taking steps to contribute to this systemic reform of American education. NASA has an Education Vision to promote excellence in American's education system by enhancing and expanding scientific and technological competence.

The Federal Government's 1994-1998 strategic plan for science, mathematics, engineering, and technology education has been developed by the Federal Coordinating Council for Science, Engineering, and Technology's Committee on Education and Human Resources (FCCSET/CHEHR). It focuses on the programs of sixteen participating Federal agencies, of which NASA is one, and their efforts toward three of the six National Education Goals (NASA, 1998).

To place emphasis on achieving the education goals, NASA developed NASA's Strategic Plan for Education: A Strategy for Change: 1993-1998. The plan provides direction to NASA's education program. NASA's Education Program delivery strategy captures student interest in science, mathematics, and technology at an early age; channels students into science, engineering, and technology career paths; and enhances the knowledge, skills and experience of pre-college teachers, college and university faculty, and other professional educators (NASA, 1998, p.3).

NASA programs are designed to make use of NASA's unique facilities and resources. The Teacher Enhancement and Preparation programs are expert-driven and are

conducted through workshop, classes, seminars, and other means (National Research Council, 1994). The main goals of the NASA Teacher Enhancement Programs are to increase teachers' knowledge about math and science using NASA related topics and to show teachers how to integrate this knowledge into teaching (Frechtling, Sharp, Carey, & Vaden-Kienan, 1995).

In many NASA programs, teachers have the opportunity to see a NASA Center firsthand. The programs are designed to help teachers, using NASA-related topics, to create and use lessons and experiences that will stimulate and engage students. NASA programs also are designed to have teachers inform and help their colleagues use what they have learned, to help students become more interested in math and science, and increase student performance (National Research Council, 1994).

Some NASA programs are short term, such as the Aerospace Education Services Program (AESP), in which aerospace specialists visit schools to make presentations for students and teachers. Specialists visit at the request of the school and present information on aerospace history and concepts using new technologies and up to date teaching practices.

The AESP goal is to enhance educator awareness and understanding of scientific research and technological development. The AESP uses NASA's unique assets to support local, state, and regional curriculum frameworks, as well as existing and emerging national education standards (NASA, 1997).

The objectives of this program are to disseminate information in aeronautics and space, to involve teachers and students at all levels of learning, and aid in the development of pre-service and in-service teachers.

NASA provides limited experiences over the summer for selected elementary and secondary teachers from around the country. These experiences are found in two workshops. They are the NASA Educational Workshops for Math, Science and Technology Teachers (NEWMAST) and the NASA Workshops for Elementary School Teachers (NEWEST).

These programs provide opportunities for K-12 teachers of mathematics, science and technology to spend two weeks at a NASA Center learning about aeronautics and space. Participants are selected by peer review by a contracting agent that assists NASA in administering the program. Each teacher receives a stipend that covers the cost of travel, housing, meals, and graduate credit. NEWMAST provides for approximately 100 secondary teachers.

NEWEST is designed to meet the needs of approximately 220 teachers, providing many experiences, including research laboratory observations, presentations, and "shadowships" (National Research Council, 1994). Individual and team projects are used to enhance the participants knowledge of space and aeronautics and to motivate the teachers to incorporate the summer workshop activities in their classrooms (National Research Council, 1994).

A more intense program sponsored by NASA is the Urban Community Enrichment Program (UCEP). It is a sub-component of the AESP program in which specialists collaborate with teachers in implementing an eight week aerospace program. Core teachers are recommended by school principals and are selected by superintendents. These teachers and an interdisciplinary team of education specialists conduct the program. The program is designed for middle level students in urban areas with high minority

populations to gain exposure to space topics. The UCEP program provides workshops during the school year and teachers commit to three weekend workshops. The first workshop is the planning workshop for the eight-week program. The planning workshop is designed to assist in the introduction of the UCEP concept to selected educators. It includes a modified assembly lecture demonstration, demonstrations of selected small group activities, and provides information on NASA resources available to teachers, as well as an opportunity to complete the participating schools individual UCEP plans. The other two workshops provide teachers with hands-on activities related to NASA's four enterprises. The four enterprises are Aeronautics and Transportation, Human Exploration and Development of Space, Space Science, and Earth Science. These emphasize math and science standards (Martel, 1997). A two-week summer enhancement workshop is held as a professional development opportunity for educators teaching grades five through eight. Selected applicants receive travel expenses, housing and meals, a stipend, three graduate credit hours, and NASA educational materials and publications (NASA Strategic Plan, 1996).

In general, teachers appear to feel very positive about their experiences in teacher enhancement programs. Most studies provide evidence that teachers feel they have gained knowledge or increase their skills through teacher enhancement programs (King, 1991).

Selected Aerospace Studies

Six dissertations which are of importance to the researcher's study are discussed below. They are Helton (1973), Romero (1973), Marks (1975), Grisgby (1979), Vogt (1990), and Jones (1996).

Helton's (1973) study provided information on how participants felt six months after attending summer workshops. Helton believed that the length of the workshop experience would not impact the number of activities teachers included in their lesson plans. He selected 500 workshop participants from 79 aerospace workshops. His use of a chi-square value of 16.877 and a comparison of it to the critical chi-square at the .05 level, which was 12.95, found that there was a significant difference between how long a workshop lasts and the number of activities that teachers included in lesson plans as a result of the workshop experience.

Romero (1973) studied the relationship between aerospace education workshops and practices and attitudes of participating teachers. He administered a questionnaire to a population of 200 subjects who had participated in workshops and 200 applicants who had not participated in workshops. He used a chi-square statistical test and found that there was not a significant relationship between workshop participation and teaching a unit dealing with aerospace education.

Marks (1975) conducted a study that examined aerospace curriculum and instruction utilization after the completion of an aerospace education workshop. His population totaled 373 participants, of which 234 responded. His findings were reported as follows: 51.3 percent did incorporate aerospace concepts in their teaching, while 43.2 percent did not. He also found that 90 percent of the participants felt the workshop was useful and beneficial to teaching methods, while 6 percent said the workshop was not.

Grigsby (1979) did a descriptive study looking a the status and need for aerospace education in Oklahoma. Grigsby's subjects consisted of participants from Oklahoma's aerospace workshops during the years of 1969-1977. Her data came from a questionnaire

which was mailed to the superintendents of all independent school districts in Oklahoma where the former workshop participants taught. Her results provided the following information: 78.9 percent of the workshop participants utilized education materials provided by NASA when they returned to their classrooms.

Vogt (1990) investigated the effectiveness of NASA educational satellite teleconferences for teacher training. He surveyed 107 site coordinators who were participants in the teleconference. His study found that 58 percent of the participants made use of the content presented in the teleconference with their students.

Jones (1996) examined whether teachers utilized aerospace concepts, subject matter, and activities after attending NASA NEWEST workshops. He used a chi-square test with a level of significance of .05 to determine if there was a relationship between demographics and the utilization of aerospace concepts, subject matter, and activities presented in the NEWEST workshops. Jones sent a questionnaire to all 75 participants who had attended workshops from the years 1993 to 1995. The findings of his study showed that over ninety percent of the participants used aerospace subject matter and concepts an average of two or more times per week, as opposed to less than ten percent who did not use the aerospace concepts.

Summary

This review of literature has shown the nature of workshops and their impact on teachers. It has also shown how workshops are used in preparing teachers to return to their classroom settings and motivate not only students to achieve, but to encourage other teachers to take advantage of the new learning processes that are offered. It is essential

for in-service and pre-service teachers be able to create, design, and participate in activities that enable them to be effective in the classroom. Not only are teachers able to follow the goals outlined by workshops, staff development and in-services, they have an opportunity to utilize materials, activities, and lessons in the workshop setting to share and train other educators (TRESP, 1981).

CHAPTER III

RESEARCH DESIGN AND METHODOLOGY

Introduction

The specific purpose of this chapter is to give a general description of the design and methodology of the study. The overall purpose of this study was to answer questions concerning the utilization of hands-on activities, curriculum instruction, resources, and integration of aerospace concepts of UCEP participants in enhancement workshops during the years of 1994, 1995, and 1996.

Population

The population of this study consisted of 220 subjects who had participated in core and summer enhancement workshops in 1994 through 1996. This study represents a cross section of urban teachers from the United States, including the U.S. Virgin Islands and the Commonwealth of Puerto Rico. The teachers in the core workshops were chosen by their school district coordinators, and were either former core teachers or teachers that had been recommended by their principal, science department chairperson, or former UCEP participants. All were required to apply for the summer workshop and provide three letters of support, including one from an administrator indicating the willingness of the

school, the district, or an educational organization to provide the teacher an opportunity to share information and materials gained from the workshop with other teachers. UCEP involves teachers of grades five through eight, therefore the teachers in this study have taught in either elementary or middle schools, with the possible exception of some who taught in at the junior high level.

Sample

The sample consisted of 140 core teachers, as indicated by "Sample Sizes Required for Given Population Sizes" (Gay, 1996). These 140 participants were involved in the UCEP core workshop and the summer enhancement workshops of 1994, 1995, and 1996. These years were used because the summer enhancement workshop was first held in 1993 and many of the problems associated with a new program were resolved for subsequent years. Additionally, the participants of the 1997 workshops have not had the opportunity to introduce their learned knowledge in the classroom. Delayed recall was also a factor in selecting particular years.

Reliable data for 1994 through 1996, and addresses provided by Oklahoma State University's Washington, DC, office enabled the researcher to conduct the study. The selected participants represented public and urban schools from across the country that had met the criteria of selection as outlined by the UCEP overview brochure and the UCEP summer enhancement workshop brochure (Appendix I).

Research Design

This study utilizes a descriptive research design. It is appropriate because it makes possible data collection to answer research questions (Appendix A). Gay states that descriptive research involves collecting data in order to test an hypothesis or to answer questions concerning the current status of the subject of the study. A descriptive study determines and reports the way things are (Gay, 1996).

This descriptive study seeks to answer questions about the utilization of hands-on activities, curriculum instruction, resources, and integration of aerospace concepts.

Instrumentation

In this study, the survey was the primary source of data collection. A survey is an attempt to collect data from members of a population in order to determine the current status of the population with respect to one or more variables. This survey instrument was developed to gather data regarding eight research questions (see page 7). When constructing a survey, validity of the survey must be taken in consideration. Validity of a survey means that a survey should measure what it is suppose to measure (Badia & Runyon, 1982). In order to validate the survey, the Chairman and members of the researcher's doctoral committee, two aerospace education specialists and three teachers from the 1997 summer workshops reviewed the survey to determine its validity. Revisions were made based on their recommendations and suggestions. The survey process was approved by the Oklahoma State University Institutional Review Board (Appendix E).

The survey instrument was designed to determine the utilization of hands-on activities, curriculum instruction, resources, and integration of aerospace concepts of UCEP participants in enhancement workshops during the years of 1994,1995, and 1996.

The survey contained twenty items. The first ten pertained to demographic information, while items eleven through twenty collected specific information regarding the utilization of UCEP workshop materials.

Pilot Study

The survey was piloted with ten teachers who had participated in the 1993 UCEP programs. These included five teachers from the UCEP core teacher enhancement workshops and 5 teachers from the summer teacher enhancement workshop.

The surveys were distributed by mail during September, 1997. The survey package included:

- a cover letter with the explained purpose of the survey and other pertinent information (Appendix B)
- a copy of the survey (Appendix C)
- an addressed and stamped postcard (Appendix D)

The post cards were coded from 00-09. This was done for follow up purposes. The survey did not include any identifying marks. The pilot study indicated that the respondents had difficulty distinguishing between urban and public schools, enabling the researcher to clarify this issue in the final survey. Also, several respondents did not complete the back of the initial survey, so the researcher was able to provide more detailed instruction for the final survey.

Data Collection

A list of 140 UCEP workshop participants was obtained from the Washington, DC, Oklahoma State University office. This office is the center for the UCEP project and where records are kept for workshops conducted by UCEP specialists.

The surveys were distributed in October, 1997. The survey package included:

- a cover letter with the explained purpose of the survey and other pertinent information
- a copy of the survey
- an addressed and stamped return envelope
- an addressed and stamped postcard

The post cards were coded from 9400-9699. This was done for follow up purposes. The survey did not include any identifying marks. The participants were asked to complete and return the survey in the addressed and stamped envelope, and to mail the post card when returning the survey. Once the postcard was received the researcher matched the code on the returned cards with a list of survey participants for follow-up purposes. After two weeks, survey participants who had not responded were sent a follow-up letter as a reminder for them to complete and return the survey.

No envelopes were opened until all participants had responded. As the envelopes were opened, the surveys were placed in a secure container and the envelopes destroyed. The surveys were not read until the envelopes were destroyed to ensure anonymity.

Analysis of Data

Descriptive statistics were used to report the responses to the survey. Frequencies and percentages were reported for analysis of research questions one through eight. Chi-square tests were conducted to test for differences in responses to research question eight, based on responses of Category I, II, and III workshop participants. A chi-square test compares proportions actually observed in a study with proportions expected. Computations were made using the SAS. The minimum requirement for statistical significance was set at an experiment-wise error rate of $p<.05$.

CHAPTER IV

RESULTS OF THE STUDY

The first three chapters of this study presented an introduction to the study, a review of selected literature, and the study's design and methodology. The purposes of this chapter are to present findings from the survey and summarize the results of the analyses of the data.

The data were gathered from a survey sent to 140 UCEP participants of workshops conducted between 1994 and 1996. Data is discussed in two sections and presented according to the research questions listed in Chapter I. Section One will report data for research questions one through seven, using frequencies and percentages of workshop participants' responses to items on the survey which are directly related to each research question. The frequencies and percentages will be concerned with:

1. background characteristics of Category I, II, and III UCEP workshop participants;
2. incorporation of NASA curriculum products in the classroom;
3. incorporation of UCEP hands-on activities in the classroom;
4. integration of aerospace curriculum materials and concepts in the classroom;
5. the sharing of workshop experiences with others;
6. the planning and preparing of interdisciplinary lessons with other teachers;

7. the usage of aerospace curriculum enhancement products.

The second section is the chi-square statistical test, which will be used to answer research question eight, found in Chapter I. It is used to determine the relationships between Category I, II, and III responses concerning:

1. workshop participants incorporation of NASA curriculum products in the classroom;
2. incorporation and use of UCEP hands-on activities in the classroom;
3. integration of aerospace curriculum materials and concepts in the classroom;
4. sharing of workshop experiences with others;
5. the planning and preparing of interdisciplinary lessons with other teachers;
6. the usage of aerospace curriculum enhancement products in the classroom.

The researcher has attempted to explain the data presented, in addition to information found in tables.

Responses to the Survey

A list of addresses of 140 UCEP participants from 1994 to 1996 were obtained from the Oklahoma State University, Washington, DC, office. A survey was sent to each participant. Of the 140 questionnaires sent, 67 questionnaires (47%) were returned. Ten surveys were returned by the post office due to inability to locate the addressee. One survey was returned because the addressee was deceased. The postcards received equaled the number of surveys sent.

Characteristics of Participants

Research Question Number One

What are the background characteristics of Category I, II, and III workshop participants in terms of gender, current teaching level, primary position in school, number of years of teaching experience, highest degree earned, type of school, number of students in the school, average number of students per class, educational classroom staffing and teacher participation in previous aerospace workshops?

Supporting data for this question are presented in Table 1, survey items 1-10 (Appendix C). Findings show that 73 percent of the participants were female and 27 percent were male. The majority of the teachers (64.2 percent) taught grades 5-8, the next largest grouping taught grades K-4 (19.4 percent), and the last taught grades 9-12 (16.4 percent). The participants were either teachers (97 percent) or administrators (3 percent). Data showed that 25.4 percent of the participants had taught eleven to fifteen years. This was followed in descending order by 16.4 percent (1-10 years), 11.9 percent (16-20 years), and 13.4 percent (25 or more years).

The following data were gathered concerning the highest college degree held by the participants. The master's degree was held by 61.2 percent; bachelor degree, 37.5 percent; and 1.5 percent held a doctorate. The participants came from various types of schools. The largest number of participants taught in public schools (44.8 percent), followed by urban schools (20.9 percent). The data reported that some participants taught in public and urban (19.4 percent), while others responded that they taught in public,

TABLE I

WORKSHOP PARTICIPANTS' DEMOGRAPHIC CHARACTERISTICS

Demographic Characteristics	Frequency	Percent
Gender		
Female	49	73.1
Male	18	26.9
Total	67	100.0
Current Teaching Level		
K-4	13	19.4
5-8	43	64.2
9-12	11	16.4
Total	67	100.0
Primary School Position		
Teacher	65	97.0
Administrator	2	3.0
Total	67	100.0
Years of Teaching Experience		
1-5	11	16.4
6-10	11	16.4
11-15	17	25.4
16-20	11	16.4
21-25	8	11.9
25 and over	9	13.4
Total	67	100.0
Highest College Degree		
Bachelor	25	37.5
Master	41	61.2
Doctorate	1	1.5
Type of School Taught		
Public	30	44.8
Private	0	9.0
Magnet	3	4.5
Military	0	0.0
Charter	0	0.0
Urban	14	20.9

TABLE I (Continued)

Demographic Characteristics	Frequency	Percent
Type of School		
Rural	3	4.5
Suburban	1	1.5
Public or Urban	13	19.4
Public, Magnet and Urban	2	3.0
Total	66	98.5
Number of Students in School		
Less than 250	3	45.5
251 - 500	11	16.7
501 - 750	30	45.5
750 - 1000	16	24.2
More than 1000	6	9.1
Total	66	98.5
Number of Students in the Classroom		
1-15	5	7.6
16-20	2	3.0
21-25	17	25.8
26-30	29	43.9
31-35	11	16.7
More than 36	2	3.0
Total	66	98.5
Classroom Staffing		
Myself	56	84.8
One other person	9	13.6
More than two persons	1	1.5
Total	66	98.5
Number of Aerospace Workshops Attended		
None	26	39.4
One	25	37.9
Two	7	10.6
Three	5	7.6
Four or More	3	4.5
Total	66	98.5

magnet and urban (3 percent). There were 4.5 percent teaching in a magnet school, 4.5 percent teaching in a rural school, and 1.5 percent teaching in a suburban school.

In relation to the average number of students per class, 1.6 percent had 1-15 students in the classroom, 3 percent had 16-20 students in the classroom, 25.8 percent had 21-25 students in the classroom, 43.9 percent had 26-30 students in the classroom, 16.7 percent had 31-35 students in the classroom, and 3 percent had more than 36 students in the classroom.

The participants came from schools of different sizes. The greatest number of participants (45.5 percent) taught in schools with 501-750 students, the next in descending order, more than 1000 (9.1 percent), 751-1000 students (24.2 percent), 251-500 students (16.7 percent), and less than 250 (4.5 percent).

Findings showed that most of the teachers (84.8 percent) were in the classroom setting alone. There were 13.6 percent of the participants who worked in the classroom with one other person. There were 1.5 percent of the participants who worked in the classroom with more than two persons.

Prior to attending UCEP 39.4 percent had never attended an aerospace workshop. On the other hand, 4.5 percent had attended four or more workshops. The percentages of participants who had attended one, two, or three workshops were 37.9, 10.6, and 7.6, respectively.

The Incorporation of NASA Curriculum

Research Question Number Two

How often have Category I, II, and III workshop participants incorporated the use of NASA curriculum products in their classroom?

To examine the incorporation of NASA curriculum products in the classroom after attending UCEP workshops, survey item number eleven was used (Appendix C). Survey item eleven is represented in Table 2.

Information presented in Table 2 shows that after attending UCEP workshops, 32.3 percent of participants equally used curriculum products in 1 to 3 lessons a year and in 4-6 lessons a year. Approximately 21.5 percent used curriculum products in more than 10 lessons a year, while only 4.6 percent used curriculum products in 7-10 lessons a year. Unfortunately, 9.2 percent did not use the curriculum products in any lesson.

Incorporation of UCEP Hands-on Activities

Research Question Number Three

How often have Category I, II, and III workshop participants incorporated the use of hands-on activities in their classroom?

To answer this question, data from survey items twelve, thirteen, and seventeen were obtained (Appendix C). Information presented in Tables 3 and 4 gives the frequency of the incorporation of hands-on activities in the classroom prior to and after attending UCEP workshops.

TABLE 2

THE INCORPORATION OF NASA CURRICULUM PRODUCTS

Curriculum Incorporation	Frequency	Percent
Have not used	6	9.2
1 - 3 lessons	21	32.3
4 - 6 lessons	21	32.3
7 - 10 lessons	3	4.6
More than 10 lessons	14	21.5
Total	65	97.0

TABLE 3

USAGE OF HANDS-0N ACTIVITIES PRIOR TO ATTENDING UCEP WORKSHOPS

Incorporation of Hands-on Activities Prior to Attending UCEP Workshops	Frequency	Percent
Never	3	4.5
Once per week	28	41.8
Twice per week	13	19.4
Three times per week	9	13.4
More than three times per week	14	20.9
Total	67	100.0

TABLE 4

USAGE OF HANDS-ON ACTIVITIES AFTER ATTENDING UCEP WORKSHOPS

Incorporation of Hands-on Activities After Attending UCEP Workshops	Frequency	Percent
Never	1	1.5
Once per week	9	13.4
twice per week	18	26.9
Three times per week	16	23.9
more than three times per week	23	34.3
Total	67	100.0

According to the information presented in Table 3, prior to attending the UCEP workshops 41.8 percent of participants were incorporating hands-on activities in the classroom, while 4.5 percent had never used hands-on activities. Data further shows that 19.4 percent of the participants used hands-on activities twice a week and that 13.4 percent were using hands-on activities in the classroom three times a week. Additional data indicates that 20.9 percent were using hand-on activities more than three times per week (Table 3).

Table 4 provided information showing that after attending the UCEP workshops, 34.3 percent of the participants used hands-on activities more than three times a week. The data also showed that 26.9 percent used hands-on activities twice a week, 23.9 percent used hands-on activities three times a week, and 13.4 percent used hands-on activities once a week. Only 1.5 percent of teachers were not using hands-on activities after attending the UCEP workshops.

The participants were given an opportunity to write additional comments regarding how they incorporated aerospace concepts and subject matter in the classroom. Some of the comments were:

- I use concepts in science experiments, to explain information, and bulletin board displays.
- I used aerospace concepts in my UFO unit of space and my Saturday student academy.
- I incorporate my NASA UCEP concepts in beginning my class and bring closure to the class.
- I used aerospace concepts in my lab moon craters.
- Incorporated aerospace concepts to introduce the lesson, homework, and promote model building in science projects.

- I have used aerospace subject matter in after school science programs, science demonstrations, and solar system activities.
- Used aerospace concepts and subject matter to teach about visiting an airport, real life application of rockets, and history lessons.
- I have used the subject matter to teach elective classes in aeronautics, writing two grants for expanding the science program, and provide additional pre engineering experience for students.
- The subject matter and aerospace concepts are used to create science projects, and promote discussion.
- Experiments, journal writing, reports, and demonstrations are many uses for my acquired NASA UCEP subject matter.
- I have used subject in teaching astronomy.
- Teachers utilized materials to supplement the science program, preparing for the science fair.
- Used science concept in journal writing.
- Experience gained from the workshop is used to prepare lesson, do demonstrations and projects.
- Utilized science concepts to study matter, weather, and physics.
- Used workshop ideas for problem solving activities with the math teacher and current events with the social studies teacher.
- Helped girls design poster cars, and rocket building.
- I have used the subject matter from the UCEP summer program to introduce airplanes and the Tuskegee Airmen.
- I have used concepts for creative writing and social studies lessons.
- Touched on subject matter for current event discussions.
- It was very helpful in teaching the history of aviation in a French class.
- I have used materials for density of the air, metric rules and chromatorgraphics technology.

- Set up learning stations.
- I have a 2 week display of the planets and am teaching the solar system.

Integration of Aerospace Curriculum

Materials and Concepts

Research Question Number Four

How have Category I, II, and III workshop participants integrated aerospace curriculum materials and concepts in their classroom?

To answer this question data was collected from item fourteen of the survey (Appendix C). Table 5 reports the data regarding integration of curriculum materials and concepts.

When given five choices for reporting answers from survey question number fourteen, respondents had a choice of answering A, B, C, D, and E (see Table 5, Appendix E). Data was supported in the following way: 31.8 percent had integrated curriculum materials and concepts by reporting answers A, B, C, D, and E; 19.7 percent had integrated curriculum by reporting answers A, B, C, and D; 12.1 percent had integrated by reporting answers A, B, and D; 6.1 percent had only reported answer C; 4.5 percent had reported answers A, B, and C; 3 percent reported answers A and B and answers A and E; and 1.5 percent had reported answers ABDE, ABE, AD, AE, BCDE, BD, CD, and CE.

TABLE 5

INTEGRATION OF AEROSPACE CURRICULUM MATERIALS AND CONCEPTS IN THE CLASSROOM

Aerospace Curriculum Materials & Concepts	Frequency	Percent
A and B	2	3.0
A B and C	3	4.5
A B C and D	13	19.7
A B C D and E	21	31.8
A B C and E	2	3.0
A B and D	4	6.1
A B D and E	8	12.1
A B and E	1	1.5
A and D	1	1.5
A and E	1	1.5
B	2	3.0
B C D and E	1	1.5
B and D	1	1.5
C	4	6.1
C and D	1	1.5
C and E	1	1.5
Total	66	98.5

Note: Respondents marked more than one response when appropriate.
A = Introduce new concepts
B = Do demonstrations
C = Integrate curriculum
D = Reinforce concepts
E = Promote model building

Workshop Experiences Shared with Others

Research Question Number Five

How have Category I, II, and III workshop participants shared their workshop experience with others?

To collect data for this question, items fifteen and sixteen from the workshop participants' survey were utilized (Appendix E). This data is shown in Table 6 and Table 7. Tables 6 and 7 report data about participants sharing their workshop experiences with others.

Data has shown that 46.3 percent of the workshop participants have shared UCEP workshop materials with one to three teachers after attending the workshops. The data shows equally that 22.4 percent have shared materials with four to six teachers and one to ten teachers respectfully. Only nine percent have shared materials with seven to ten teachers.

The participants were given an opportunity to write any additional comments regarding sharing materials with others. Examples are as follows:

- I have used demonstrations at staff development workshops.
- Demonstrated to other teachers how to make different paper airplanes.
- Shared rocketry guide activities with other teachers on my team.
- Presented NASA class activities to other teachers during staff and faculty meetings.
- Used activity guides at NSTA presentations.
- I have used lessons from UCEP summer enhancement workshops (B.Y.O. A.) to work with teachers and educators on in-service days.
-

TABLE 6

SHARING OF UCEP WORKSHOP MATERIALS WITH OTHERS

Shared With Others	Frequency	Percent
Shared with 1 -3 teachers	31	46.3
Shared with 4 - 6 teachers	15	22.4
Shared with 7 - 10 teachers	6	9.0
Shared with more than 10 teachers	15	22.4
Total	67	100.0

TABLE 7

MODELED AND DEMONSTRATED ACTIVITIES BY WORKSHOP PARTICIPANTS

Demonstrated	Frequency	Percent
Yes	28	43.1
No	37	56.9
Total	65	97.0

Note: Frequency missing = 2

- Many activities have been used in Math, Science, and Technology Literacy Workshops.
- Presented lessons and B.Y.O.A. activities at Elementary School Science Association Workshops.
- I presented at P.T.A. workshops.
- Science lessons were used in my in-service teachers course.
- Showed the Rocketry, Space Base Astronomy, and Suited for Space Walking guides at my teacher in-service showing how science lessons can be incorporated in other disciplines.
- Presented at several science workshops using lessons from core workshops.
- Used pictures and slides that I made during summer and core workshops for teacher educator in our schools.
- I have made available materials for other teachers to check out and circulate.
- I made models of the space suit, shuttle, and the Hubble Telescope to do demonstrations for primary teachers in presenting to their students.
- Presented at the CHROME workshop, worked with teachers on a one to one basis about resources NASA has for educators.
- Presented workshops for Junior League of Women during career week.
- Presented at Staff Development.
- Modeled and demonstrated activities for other science teachers in my school.
- Presented at NSTA; national and regional.
- Presented at regional teacher meets.
- I shared my activities in a workshop with a group of student teachers in preparation of lessons.
- I shared with teachers lessons during Professional Development Summer programs.
- I used activities with students for SECME workshops.

- Taught and used demonstration lessons at Georgia Tech Summer "Escape" program for Civil Engineer and Aerospace Program.
- Provided a bibliography, open my classroom for observation, and assisted other teachers in class presentations.
- Materials were used for PTA group activities.
- I have presented at open house and parent conferences.
- Explained teacher resources that are available and how to use the materials
- I presented before Norfolk public school teachers, PTA programs, Science and Math Clubs, church youth groups and professional conferences in the area.
- Used the following guides to present to professional staff teachers, rocketry, aeronautics, and living and working in space.
- As a curriculum specialist, I have used the opportunity to demonstrate aerospace materials to PTA, Early childhood, and pre-school faculty.
- I presented to special education teachers, curriculum specialist groups, and the Black Infusion Faculty Staff Project.
- Presented to the Gifted and Talented Program teachers.
- Presented at local science organization meetings.
- Presented at in-service meetings and provided materials for check out.
- Led workshops with parents, teachers and administrators to incorporate aerospace concepts.
- Presented at training labs and training other teachers in aerospace concepts.
- Presented workshops at the Universidad Central de Bayamon, Puerto Rico.
- In-service of teachers, parents, and administrators.

To further explain how teachers shared and modeled activities and techniques learned from the NASA UCEP workshops, data has shown that 43.1 percent of

participants have modeled and demonstrated activities to other groups. Additional data shows that 56.9 percent have not modeled and demonstrated to other groups (Table 7).

Planning and Preparation of Interdisciplinary Lessons

Research Question Number Six

How have Category I, II, and III workshop participants worked with teachers of other disciplines to plan and prepare interdisciplinary lessons?

To collect data for this question, item eighteen from the workshop participants' survey was utilized (Appendix C). The data is shown in Table 8. Table 8 reports data regarding the participants working with teachers of other disciplines to plan and prepare interdisciplinary lessons after attending UCEP workshops.

Workshop participants were given eight choices for response. These choices are reported by participants choosing one or more answers when appropriate.

Findings show that since attending the NASA UCEP workshop, 24.6 participants have worked with teachers in mathematics, social studies, and language arts to plan and prepare interdisciplinary lessons. 11.5 percent of the teachers reported they have worked with teachers only in mathematics, 8.2 percent of the participants have worked with teachers in the areas of mathematics, social studies, art, and language arts, and 6.6 percent have worked with teachers in the areas of mathematics, social studies, language arts and physical education.

Approximately 4.9 percent of workshop participants reported planning and preparing lessons with other teachers in the following groupings: mathematics and social studies; language arts; and other disciplines. It was noted that 3.3 percent worked with

TABLE 8

PLANNING AND PREPARING INTERDISCIPLINARY LESSONS WITH OTHER TEACHERS

Disciplines	Frequency	Percent
Mathematics	7	11.5
Mathematics & Social Studies	3	4.9
Mathematics, Social Studies, Art	1	1.6
Mathematics, Social Studies, Art, Language	5	8.2
Mathematics, Social Studies, Art, Language Arts, and, Music	1	1.6
Mathematics, Social Studies, Art, and Music	1	1.6
Mathematics, Social Studies, Art, and Industrial Arts	1	1.6
Mathematics, Social Studies, and Language Arts	15	24.6
Mathematics, Social Studies, Language Arts, Physical Education	4	6.6
Mathematics, Social Studies, Language Arts, and Music	1	1.6
Mathematics, Social Studies, Language Arts, and Industrial Arts	2	3.3
Mathematics, Social Studies, Language Arts, Writing	2	3.3
Mathematics and Art	1	1.6
Mathematics, Art, and Language Arts	2	3.3
Mathematics, Art, and Industrial Arts	2	3.3
Mathematics and Language Arts	2	3.3
Mathematics, Language Art, Physical Education, Music, Industrial Arts, and Technology	1	1.6
Social Studies and Language arts	2	3.3
Social Studies, Language arts, Music	1	1.6
Language Arts	3	4.9
Language arts and Writing	1	1.6
Computer Technology	3	4.9
Total	61	93.0

*Missing 6 frequencies

teachers in these disciplines: mathematics, social studies, language arts, and industrial arts; mathematics, social studies, language arts, and other disciplines. Only 1.6 percent of the participants worked with teachers in the following:

1. mathematics, social studies, art, language arts, and music
2. mathematics, social studies, art, and music
3. mathematics, social studies, industrial arts
4. mathematics, social studies, language arts, and music
5. mathematics and art
6. mathematics, language arts, physical education, music, industrial arts, and other (science writing)
7. language arts and other (computer technology)

Usage of Aerospace Curriculum Enhancement Products

Research Question Number Seven

How have Category I, II, and III workshop participants made use of aerospace curriculum enhancement products?

To gather data regarding this question, item nineteen from the survey was utilized (Appendix C). Table 9 reports the data.

When asked how often workshop participants in the above categories use curriculum products, participants responded in the following way. Participants could provide more than one answer when appropriate. Fifteen and four-tenths percent of the participants reported that they used enhancement products in classroom independent learning stations, classroom aesthetic environment, reward for student work, bulletin

TABLE 9

USAGE OF CURRICULUM ENHANCEMENT PRODUCTS

Areas	Frequency	Percent
Learning Station	1	1.5
Learning Station, Classroom Environment, and Reward for Student Work	3	4.6
Learning Station, Environment, Rewards, and Bulletin Boards	1	1.5
Learning Station, Environment, Rewards, Bulletin Boards, and Reference Material	10	15.4
Learning Station, Environment, Rewards, and Reference Materials	1	1.5
Learning Station, Environment, and Rewards	8	12.3
Learning Station, Environment, Bulletin Boards/Displays, and Reference Materials	12	18.5
Learning Station Environment, Reference Material	2	3.1
Learning Stations, Bulletin Boards, and Reference Material	1	1.5
Learning Stations and Reference Materials	1	1.5
Environment	1	1.5
Environment, Rewards for Student Work, Bulletin Board, Reference Materials	3	4.6
Environment, and Bulletin Boards/ Displays	1	1.5
Environment, Bulletin Boards, and Reference Materials	5	7.7
Rewards for Student Work	1	1.5
Rewards, Bulletin Boards, and Reference Material	2	3.1
Bulletin Boards/Displays, and Reference Materials	2	3.1
Reference Materials	2	3.1
Total	65	97.0

*Frequency Missing = 2

boards/display, and reference materials. When asked if they used the products for classroom independent stations, classroom environment, rewards for student work, bulletin boards/displays, and reference material, 18.5 responded affirmatively. Approximately 12.3 percent responded that they used the curriculum products to develop independent learning stations, classroom environment, and bulletin boards/displays. Seven point seven percent of the participants used curriculum products in the development of classroom environment, bulletin board displays, and reference materials. Ten and eight-tenths percent found that curriculum products could be used to develop learning stations, bulletin boards, and reference materials.

Other groupings of usage of curriculum products were reported in the following way:

- 4.6 percent used curriculum products in learning stations, classroom environment, reward for student work, and bulletin boards.
- 4.6 percent used curriculum products in classroom environment, rewards for students, bulletin boards, and reference material.
- 3.1 percent used curriculum in learning stations, classroom environment, and reference material.
- 3.1 percent used curriculum products for student rewards, bulletin boards, and reference material.
- 3.1 percent used curriculum products to develop bulletin boards and reference materials.
- 3.1 percent only used curriculum products for reference materials.
- 1.5 percent used curriculum products in learning stations only.
- 1.5 percent only used curriculum products to develop learning stations, classroom environment, and reference materials.
- 1.5 percent only used curriculum materials to develop learning stations, classroom environment, bulletin boards, and reference materials.

- 1.5 percent used curriculum materials to develop learning stations and bulletin boards displays.
- 1.5 percent used curriculum materials to develop learning stations and reference materials.
- 1.5 percent used curriculum products only to develop the classroom environment.
- 1.5 percent used curriculum products to develop classroom environment and bulletin boards.
- 1.5 percent used curriculum products only to reward students work.

The chi-square statistical test was used to answer research question eight and determine the relationship between workshop participants identified as Category I, Category II, Category III, and:

1. incorporation of NASA curriculum products in the classroom;
2. incorporation and use of UCEP hands-on activities in the classroom;
3. integration of aerospace curriculum materials and concepts in the classroom;
4. sharing of workshop experiences with others;
5. the planning and preparing of interdisciplinary lessons with other teachers;
6. the usage of aerospace curriculum enhancement products in the classroom.

To collect data for question eight, survey items eleven, thirteen, fourteen, fifteen, sixteen, eighteen, and nineteen (Appendix C) were used to determine a relationship with survey item twenty. Table 10 reports data showing the relationship between the Category I, II, and III participants and the incorporation of NASA curriculum products in the classroom. The chi- square statistical test at the .05 significance level showed no significant relationships between the categories.

TABLE 10

CHI-SQUARE VALUES REFLECTING RELATIONSHIP BETWEEN CATEGORY I, CATEGORY II, AND CATEGORY III AND INCORPORATION OF NASA CURRICULUM PRODUCTS IN THE CLASSROOM

WORK SHOPS	NOT USED	1-3	4-6	7-10	10+	DF	VALUE	PROB	LEVEL. OF SIG.
Category I	1	5	5	1	0				
Category II	3	9	4	1	8	8	8.893	0.35	N. S.
Category III	2	7	12	1	6				
TOTAL	6	21	21	3	14 = 65				

* Frequency missing = 2

Table 11 reports data reflecting a relationship between Category I, II, and III participants and incorporation and use of UCEP hands-on activities in the classroom after attending UCEP workshops. The chi-square statistical test at the .05 level of significance showed no significant relationship between the categories.

The data shown in Table 12 reflects a relationship between Categories I, II, and III and integration of aerospace curriculum materials and concepts in the classroom. The chi -square statistical test, at the .05 level of significance, showed no significant relationships between these groups.

The data shown in Table 13 and Table 14 reflects a relationship between Categories I, II, and III and sharing of workshop experiences with others. The chi-square statistical test, at the .05 level of significance, showed no significant relationships between these groups.

The relationship between the Categories I, II, and III and planning and preparing of interdisciplinary lessons with others is reported in Table 15. At .05 level of significance, the chi-square test found a significant relationship between Category I, Category II and Category III workshop participants and planning and preparing interdisciplinary lessons with others. This means that these relationships exist beyond chance factor. Due to lower than expected cell counts, the computer program used to analyze the data warned that the chi-square statistical test may not be a valid test for the data.

Table 16 shows data reflecting a relationship between Category I, II, and III and usage of aerospace curriculum enhancement products. The chi-square statistical test, at the 0.5 level, showed no significant relationship exists between the groups.

TABLE 11

CHI-SQUARE VALUES REFLECTING RELATIONSHIP BETWEEN CATEGORY I, CATEGORY II, AND CATEGORY III AND USE OF HANDS-ON ACTIVITIES IN THE CLASSROOM

WORK SHOPS	0 PER WK.	1 PER WK.	4-6 WK.	7-10 WK.	10+ WK.	DF	VALUE	PROB	LEVEL OF SIG.
Category I	0	1	3	3	5				
Category II	1	3	6	5	10	8	3.583	0.89	N. S.
Category III	0	5	9	8	8				
TOTAL	1	9	18	16	23	67			

TABLE 12

CHI-SQUARE VALUES REFLECTING RELATIONSHIP BETWEEN CATEGORY I, CATEGORY II, AND CATEGORY III AND INTEGRATION OF AEROSPACE CURRICULUM MATERIALS AND CONCEPTS IN THE CLASSROOM

WORK SHOPS	New	Demo	Inte-grate	Rein-force	Pro-mote	DF	VALUE	PROB	LEVEL OF SIG.
Category I	1	3	1	4	3				
Category II	3	3	3	6	9	10	8.56	0.57	N. S.
Category III	2	1	4	14	9				
TOTAL	6	7	8	24	21				

66

* Frequency missing = 1

TABLE 13

CHI-SQUARE VALUES REFLECTING RELATIONSHIP BETWEEN CATEGORY I, CATEGORY II, AND CATEGORY III AND SHARING OF WORKSHOP EXPERIENCES WITH OTHERS

WORK SHOPS	Not shared	1-3	4-6	7-10	10+	DF	VALUE	PROB	LEVEL. OF SIG.
Category I	0	8	2	0	2				
Category II	0	8	7	4	6	6	5.72	0.455	N. S.
Category III	0	15	6	2	7				
TOTAL 67	31	15	6	15					

TABLE 14

CHI-SQUARE VALUES REFLECTING RELATIONSHIP BETWEEN CATEGORY I, CATEGORY II, AND CATEGORY III AND SHARING OF WORKSHOP EXPERIENCES WITH OTHERS

WORK SHOPS	Demo Yes	Demo No	DF	VALUE	PROB	LEVEL. OF SIG.
Category I	4	7				
Category II	13	11	2	1.909	0.385	N. S.
Category III	11	19				
TOTAL 65	28	37				

* Frequency missing = 2

TABLE 15

CHI-SQUARE VALUES REFLECTING RELATIONSHIP BETWEEN CATEGORY I, CATEGORY II, AND CATEGORY III AND PLANNING AND PREPARING OF INTERDISCIPLINARY LESSONS

WORK SHOPS	Math	S.S.	Art	Lang.	P.E.	Music & Other	DF	Value	Prob.	LEVEL OF SIG
Category I	5	2	3	2	0	0				
Category II	10	5	2	6	1	1	10	19.09	0.039	.05
Category III	4	2	16	8	0	0				
TOTAL 67	19	9	21	16	1	1				

TABLE 16

CHI-SQUARE VALUES REFLECTING RELATIONSHIP BETWEEN CATEGORY I, CATEGORY II, AND CATEGORY III AND USAGE OF AEROSPACE CURRICULUM ENHANCEMENT PRODUCTS IN THE CLASSROOM

WORK SHOPS	Learn Stat.	Envi- ronment	Rew	B. B.	R.Mat.	DF	VALUE	PROB	LEVEL OF SIG.
Category I	2	1	5	2	2				
Category II	3	3	12	5	2	8	6.356	0.607	N. S.
Category III	2	1	10	11	6				
TOTAL	7	5	27	18	10				
67									

In summary, this chapter has presented the results of the study. Data were presented according to the research questions listed in Chapter I. The data for research questions one through seven were presented using frequencies and percentages of the UCEP participants' responses to items on the survey which are directly related to each research question. The frequencies and percentages were influenced by:

1. background characteristics of Category I, II, and III UCEP workshop participants;
2. incorporation of NASA curriculum products in the classroom;
3. incorporation of UCEP hands-on activities in the classroom;
4. integration of aerospace curriculum materials and concepts in the classroom;
5. the sharing of workshop experiences with others;
6. the planning and preparing of interdisciplinary lessons with other teachers;
7. the usage of aerospace curriculum enhancement products.

The chi-square statistical test was used to answer research question eight, found in Chapter I. It was used to determine the relationships between the Category I, II, and III workshop participants and:

1. incorporation of NASA curriculum products in the classroom;
2. incorporation and use of UCEP hands-on activities in the classroom;
3. integration of aerospace curriculum materials and concepts in the classroom;
4. sharing of workshop experiences with others;
5. the planning and preparing of interdisciplinary lessons with other teachers;
6. the usage of aerospace curriculum enhancement products in the classroom.

CHAPTER V

SUMMARY, FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The purpose of this study was to determine to which degree workshop participants utilize hands-on activities, curriculum instruction, resources and integration of aerospace concepts, and if the impact on their classroom instruction varied after attending only the UCEP summer enhancement workshop, the core workshop, or both the summer and core workshops.

The subjects of this study were 140 participants who had attended UCEP enhancement workshops during the years of 1994 through 1996. These workshops represented public and urban schools from the United States, including the U.S. Virgin Islands and the Commonwealth of Puerto Rico.

Data was obtained from a survey mailed to each participant. The survey was devised to collect demographic information, determine the utilization of hands-on activities, curriculum instruction, and resources, and integration of aerospace concepts having an impact on classroom instruction.

The approved survey was comprised of 20 questions. It was mailed to each participant, accompanied by a cover letter and a returned postcard. The first ten items gathered data about the demographic characteristics of the participant. Items eleven through twenty collected specific information regarding how the participants utilized materials. Surveys were mailed October 31, 1997, to 140 participants with 67 (47 percent) participants returning the completed survey.

Upon receipt of the completed survey data was coded and processed using the Statistical Analysis Software system. Frequency counts were tabulated for each question and percentages were computed for the total returned population. The chi-square statistical test was used, at the 0.5 significance level, to determine a relationship between Category I, II, and III workshop participants responses to research questions two through seven.

The following research questions were discussed:

1. What are the background characteristics of Category I, II, and III workshop participants in terms of gender, current teaching level, primary position in school, number of years of teaching experience, highest degree earned, type of school, number of students in the school, average number of students per class, educational classroom staffing and teacher participation in previous aerospace workshops?

2. How often have Category I, II, and III workshop participants incorporated the use of NASA curriculum products in their classroom?

3. How often have Category I, II, and III workshop participants incorporated the use of hands-on activities in their classroom?

4. How have Category I, II, and III workshop participants integrated aerospace curriculum material and concepts in their classroom?

5. How have Category I, II, and III workshop participant shared their workshop experiences with others?

6. How have Category I, II, and III workshop participants worked with teachers of other disciplines to plan and prepare interdisciplinary lessons?

7. How have Category I, II, and III workshop participants made use of aerospace curriculum enhancement products?

8. Do Category I, II, and III workshop participants differ in their responses to research questions two through eight?

Findings

Based on data presented in Chapter 4, the findings of the study are as follows:

1. Seventy-three percent of the UCEP participants were female.
2. Over sixty percent of the teachers taught grades five through eight.
3. Over ninety percent of the participants were teachers.
4. Sixty-one percent of the participants had a master's degree.
5. Forty-five percent of the participants taught in public schools.
6. The greatest number of the participants taught in schools where the student population was 501-750.
7. Over eighty percent of the participants taught alone in a classroom setting.
8. Over forty percent of the participants had never attended an aerospace workshop.

9. Over half of the participants, after attending the UCEP workshops, used curriculum products in the classroom from 3-6 lessons a year.
10. Prior to the UCEP workshop only twenty percent were using hands-on activities more than three times per week.
11. After attending the workshop more than thirty-three percent were using hands-on activities more than three times per week.
12. The majority of the participants integrated curriculum in the following disciplines: introduction of concepts, demonstrations, curriculum integration, concept reinforcement, and model building.
13. Over forty-five percent of the workshop participants shared UCEP materials with one to three teachers.
14. The largest number of workshop participants have worked with teachers in mathematics, social studies, and language arts to plan and prepare interdisciplinary lessons.
15. The majority of the workshop participants used curriculum enhancement products for classroom learning stations, classroom environment, reward for student work, bulletin boards, and reference materials.
16. There was not a significant relationship between Category I, II, and III in their response to the use of material in the curriculum number of times per year. This means that the participants reported in a similar way.

17. There was not a significant relationship between Category I, II, and III in their response to incorporating hands-on activities in the classroom prior to the UCEP workshop. This means that the participants reported their response in a similar fashion.
18. There was not a significant relationship between Category I, II, and III in their response to using hands-on activities in the classroom after attending the UCEP workshops. This means that the participants reported in a similar manner.
19. There was not a significant relationship between Category I, II, and III in their response to using aerospace curriculum materials to introduce new concepts, do demonstrations, reinforce concepts, and promote model building. This means that the participants reported in a similar fashion.
20. There was not a significant relationship between Category I, II, and III in their response to sharing workshop materials with other teachers. This means the workshop participants reported alike.
21. There was not a significant relationship between Category I, II, and III in their response to modeling and demonstrating techniques to other groups. This means that participants responded alike.
22. There was not a significant relationship between Category I, II, and III in their response to using curriculum enhancement products from the workshop to develop learning stations, aesthetic environment, rewards for student work, bulletin boards, and reference material. This means that the workshop participants responded in similar fashion.

Conclusions

The following conclusions were reached from the findings of this study:

- The UCEP participants are sharing their experiences and knowledge with others.
- The findings indicate that workshop participants have utilized materials, aerospace concepts, hands-on activities, and curriculum materials in the classroom.
- Judging from the positive responses the UCEP participants found the workshops very effective.
- Workshop participants have planned and prepared more interdisciplinary lessons.
- UCEP participants are demonstrating and modeling activities and techniques to various teacher groups, civic groups, and professional conferences.
- Teachers who have attended both the core workshop and summer enhancement workshop have used curriculum materials in more lessons each year.
- Teachers who have attended both the core workshop and summer enhancement workshop have increased their introduction of new aerospace concepts, presenting more demonstrations, integrating the curriculum, reinforcing new concepts, and promoting model building.

- Teachers who have attended core workshops and summer enhancement workshops have developed learning stations, aesthetic environments, student rewards, bulletin boards, and reference materials.
- Overall classroom instruction has been impacted by the use of materials acquired from UCEP participants who have attended both the core workshop and the summer enhancement workshop.

Recommendations

The findings and conclusions of this study lead to the following recommendations by the author:

1. UCEP coordinator and team seek qualified male applicants, because at the middle grade levels positive male role models are needed.
2. UCEP workshops continue to be funded by NASA because participants have responded very favorably to components of the enhancement.
3. UCEP workshops continue promoting and providing hands-on activities for the workshop participants' classroom.
4. UCEP workshops follow the structure and format, emphasizing more mathematics and technology.
5. Graduate credit continue to be given for summer enhancement workshops enabling teachers continued professional growth.
6. Demographic information could be useful to determine if there is a relationship between demographic data and responses to various questions.
7. Increase UCEP workshops conducted during the school year.

8. Provide more time for UCEP participants to share workshop experiences with others.

9. In future research studies the researcher should collapse the cells to allow for frequency of >5 or degree of frequency >2, but the collapsing of the cells must make conceptual sense.

10. Compare the UCEP workshops with other NASA enhancement workshops.

11. Additional long-term feedback and follow-up studies on the utilization of aerospace concepts, materials, curriculum integration by UCEP participants should be conducted to explain how they are further used in classroom instruction.

Recommendations for Future Research

1. Future research should study ways UCEP workshops could be enhanced and improved to reach more teachers and better meet the needs of former UCEP participants.

2. In order to provide more information about the utilization of materials used by UCEP teachers, conduct a study to see if there are differences in demographics of the participants and their use of NASA curriculum products in all UCEP workshops.

3. Determine the degree to which UCEP participants integrate the aerospace education subject matter, concepts, and hands-on activities and the usefulness of materials by providing needed follow-up and feedback.

4. Conduct a study to see to what extent have students' attitudes toward mathematics and science improved after teachers attend UCEP teacher enhancement workshops.

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APPENDIXES

APPENDIX A

RESEARCH QUESTIONS

The researcher will seek to gather data to answer the following questions:

1. What are the background characteristics of Category I, II, and III workshop participants in terms of their gender, current teaching level, primary position in school, number of years of teaching experience, highest degree earned, type of school in which they teach, number of students in the school, average number of students per class, educational classroom staffing and teacher participation in previous aerospace workshops?

2. How often have Category I, II, and III workshop participants incorporated the use of NASA curriculum products in their classroom?

3. How often have Category I, II, and III workshop participants incorporated the use of hands-on activities in their classroom?

4. How have Category I, II, and III workshop participants integrated aerospace curriculum material and concepts in their classroom?

5. How have Category I, II, and III workshop participant shared their workshop experience with others?

6. How have Category I, II, and III workshop participants worked with teachers of other disciplines to plan and prepare interdisciplinary lessons?

7. How have Category I, II, and III workshop participants made use of aerospace curriculum enhancement products?

8. Do Category I, II, and III workshop participants differ in their responses to research questions two through seven?

APPENDIX B

SURVEY COVER LETTER

Aerospace Education Services Program

National
Aeronautics and
Space
Administration

October 31, 1997

Dear UCEP Participant:

Oklahoma State University has been an integral part of the planning and preparation of workshops conducted by NASA's Urban Community Enrichment Program (UCEP) for the last four years. To plan for future workshops that better meet the needs of teachers, your participation is requested in a study to improve our understanding of the UCEP workshops.

As a former UCEP participant, your input is critical. Please fill out the enclosed survey to the best of your knowledge. After you have completed the survey, please return it and the enclosed postcard in the self addressed, stamped envelope provided.

To assure anonymity, the postcard is coded to account for the number of surveys returned. Confidentiality will be further protected by destroying the return envelopes upon receipt, prior to reading the survey responses.

Thank you for your assistance in this study. Your cooperation and immediate response is greatly appreciated.

Sincerely,

Kenneth E. Wiggins
Director

APPENDIX C

SURVEY INSTRUMENT

Oklahoma State University
Center for Aviation and Space Education

NASA Urban Community Enrichment Program (UCEP) Workshop

To aid in improving the NASA UCEP workshops, please respond to all of the statements or questions to the best of your knowledge. Some questions require that you circle the corresponding letter, while other questions offer you the opportunity to provide examples of your unique experience. Please DO NOT include your name. Thank you for your assistance with this survey.

1. **My gender is:**

   A. Male
   B. Female

2. **The grade(s) I currently teach are:**

   A. K-4
   B. 5-8
   C. 9-12

3. **My primary position in the school is:**

   A. Teacher
   B. Administrator
   C. Counselor
   D. Librarian

4. **My number of years of teaching experience is:**

   A. 1-5 years
   B. 6-10 years
   C. 11-15 years
   D. 16-20 years
   E. 21-25 years
   F. over 25 years

5. **My highest college degree attained is:**

   A. Bachelor's
   B. Master's
   C. Doctorate

6. The type of school in which I teach is (circle all that apply):

A. Public
B. Private
C. Magnet
D. Military
E. Charter
F. Urban
G. Suburban
H. Rural

7. The number of students in my school is:

A. Less than 250
B. 251-500
C. 501-750
D. 751-1000
E. More than 1000

8. The average number of students in my classes is:

A. 1-15
B. 16-20
C. 21-25
D. 26-30
E. 31-35
F. More than 36

9. The educational staffing (e.g., teacher, teacher's assistant) of my classroom is:

A. Myself
B. Myself and one other person
C. Myself and two other people
D. Myself and three other people
E. Myself and more than three other people

10. The number of aerospace workshops I attended prior to attending NASA UCEP was:

A. None
B. One
C. Two
D. Three
E. Four or more

11. I have used the curriculum materials provided in the NASA UCEP workshop to enhance my subject curriculum:

A. I have not used them
B. 1-3 lessons this year
C. 4-6 lessons this year
D. 7-10 lessons this year
E. More than 10 lessons this year

12. Prior to the NASA UCEP workshop, I incorporated hands-on activities in my classroom an average of:

A. Never
B. Once per week
C. Twice per week
D. Three times per week
E. More than three times per week

13. After the NASA UCEP workshop, I have used hands-on activities in my classroom an average of:

A. Never
B. Once per week
C. Twice per week
D. Three times per week
E. More than three times per week

14. To the best of my recollection. I have used the aerospace curriculum materials to: (circle all that apply)

A. Introduce new concepts
B. Do demonstrations
C. Integrate the curriculum
D. Reinforce concepts
E. Promote model building

15. I have shared NASA UCEP workshop materials with other teachers:

A. I have not shared materials
B. With 1-3 teachers
C. With 4-6 teachers
D. With 7-10 teachers
E. With more than 10 teachers

16. I have modeled and demonstrated activities and techniques from the NASA UCEP workshop by giving presentations to teacher groups, PTA groups, civic groups, professional conferences, etc.

A. Yes
B. No

If yes, please give examples:

_____

_____

_____

_____

17. Examples of incorporating NASA UCEP aerospace education concepts and subject matter in my classroom instruction are:

_____
_____
_____
_____

18. Since the NASA UCEP workshop, I have worked with teachers of other disciplines to plan and prepare interdisciplinary lessons in: (circle all that apply)

A. Mathematics
B. Social Studies
C. Art
D. Language arts
E. Physical education
F. Music
G. Industrial arts
H. Other (please list) _____

19. I have used the curriculum enhancement products from the workshop to develop: (circle all that apply)

A. Classroom independent learning stations
B. Classroom aesthetic environment
C. Rewards for student work
D. Bulletin boards/displays
E. Reference material

20. I have attended one of the following NASA UCEP teacher enhancement workshops: (please circle only one)

A. NASA UCEP Core Teacher Enhancement Workshop
B. NASA UCEP Summer Teacher Workshop
C. Both the NASA UCEP Core Teacher and Summer Teacher Workshops

Thank you for your time!

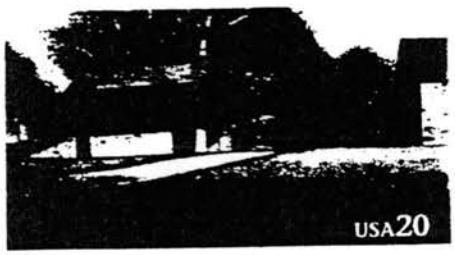
APPENDIX D

CODED POSTCARD

Please drop this postcard in the mail when you return your completed survey.

Thanks!

9534



OKLAHOMA STATE UNIVERSITY
500 'E' STREET SW
SUITE 220
WASHINGTON DC 20024

APPENDIX E

OSU INSTITUTIONAL REVIEW BOARD

APPROVAL FORM

OKLAHOMA STATE UNIVERSITY
INSTITUTIONAL REVIEW BOARD
HUMAN SUBJECTS REVIEW

Date: 09-08-97 **IRB#:** ED-98-010

Proposal Title: NASA URBAN COMMUNITY ENRICHMENT SUMMER ENHANCEMENT WORKSHOP IMPACT ON CLASSROOM INSTRUCTION

Principal Investigator(s): Steve Marks, Lucretia Octavia Tripp

Reviewed and Processed as: Exempt

Approval Status Recommended by Reviewer(s): Approved

ALL APPROVALS MAY BE SUBJECT TO REVIEW BY FULL INSTITUTIONAL REVIEW BOARD AT NEXT MEETING, AS WELL AS ARE SUBJECT TO MONITORING AT ANY TIME DURING THE APPROVAL PERIOD.
APPROVAL STATUS PERIOD VALID FOR DATA COLLECTION FOR A ONE CALENDAR YEAR PERIOD AFTER WHICH A CONTINUATION OR RENEWAL REQUEST IS REQUIRED TO BE SUBMITTED FOR BOARD APPROVAL.
ANY MODIFICATIONS TO APPROVED PROJECT MUST ALSO BE SUBMITTED FOR APPROVAL.

Comments, Modifications/Conditions for Approval or Disapproval are as follows:
This application meets all of the requirements needed to be exempt from IRB review.

Signature: John H. Wyckoff

Chair of Institutional Review Board

Date: September 8, 1997

cc: Lucretia Octavia Tripp

APPENDIX F

FOLLOW-UP LETTER

National
Aeronautics and
Space
Administration

Aerospace Education Services Program

November 15, 1997

Dear UCEP Participant,

You recently received a survey requesting your help in planning for future workshops that better meet the needs of teachers. Your participation is requested in a study to improve our understanding of the UCEP workshops.

If you have already returned your survey please disregard this letter. If you have not please take a few moments at your convenience and complete.

Please don't forget to fill out the enclosed survey to the best of your knowledge. After you have completed the survey, please return it and the enclosed postcard immediately in the self addressed, stamped envelope provided.

To ensure anonymity, the postcard is coded to account for the number of surveys returned. Confidentiality will be further protected by destroying the return envelopes upon receipt, prior to reading the survey responses.

Thank you for your assistance in this study. Your cooperation is greatly appreciated.

Sincerely,

Kenneth E. Wiggins
Director

APPENDIX G

THE 1995 NASA UCEP ENHANCEMENT

WORKSHOP AGENDA

NASA/UCEP Summer Teacher Workshops

Urban Community Enrichment Program (UCEP)

Summer Teacher Workshops

June19 - July 2, 1995
July 9 - July 22, 1995

Norfork, Virginia

URBAN COMMUNITY ENRICHMENT PROGRAM
N A S A
LAUNCHING YOUNG MINDS

Sunday, July 9:

6:30 p.m. - 8:30 p.m.	**Registration** Ice-Breaking Actility Van Assignments Tours/Departure Times Tee-Shirts	**Franklin Room**

Monday, July 10:

7:00 a.m. - 8:00 a.m.	**Breakfast** (On your own)	
8:00 a.m. - 10:00 a.m.	**Welcome** Mr. Larry Bilbrough Education Specialist Elementary & Secondary Programs Branch Education Division NASA Headquarters	**Franklin Room**
	Requirements for Stipend, Credit Hours and Grades Mr. Richard Adams Assistant Director Aerospace Education Services Program (AESP)	
	Workshop Overview *Aerospace Follies (Drama Project)* Dr. Joe Martel UCEP Coordinator	
	Bring Your Own Activity (B.Y.O.A.) Mr. Randy Hunt Aerospace Education Specialist	
	Portfolio Ms. Mildred Gilbert Aerospace Education Specialist	
10:15 a.m. - 10:30 a.m.	**Break**	
10:30 a.m. - 12:00 p.m.	**Strato Blaster (construction)** Dr. Joe Martel	**Franklin Room**
12:00 p.m. - 1:00 p.m.	**Lunch** (On your own)	

Wednesday, July 12:

7:00	a.m.	- 7:30	a.m.	**Breakfast** (On your own)	
7:30	a.m.	- 8:30	a.m.	**Leave Marriott Hotel** **Destination: Patriot Aviation** Williamsburg, VA	
8:30	a.m.	- 12:00	p.m.	**Patriot Aviation -** **Flight Training Seminar** Amplified Preflight Inspection Flight Planning Control Tower Ground Trainer Flight Trainer Optional Station Careers	
12:00	p.m.	- 1:00	p.m.	**Lunch** (On your own)	
1:00	p.m.	- 4:30	p.m.	**Patriot Aviation - cont'd**	
4:30	p.m.	- 5:15	p.m.	**Leave Patriot Aviation** Destination: Marriott Hotel	
5:15	p.m.	- 7:00	p.m.	**Dinner** (On your own)	
7:30	p.m.	- 9:30	p.m.	**B.Y.O.A.** Mr. Randy Hunt	**Franklin Room**

Thursday, July 13:

7:00	a.m.	- 8:00	a.m.	**Breakfast** (On your own)	
8:00	a.m.	- 9:00	a.m.	**Leave Marriott Hotel** **Destination: Virginia Air &** Space Center (VASC)	
9:00	a.m.	- 10:00	a.m.	**Aerospace Workshop** **(Teacher Resource Room)** UCEP Facilitator	
10:00	a.m.	- 11:00	a.m.	**Attend IMAX Presentation**	
11:00	a.m.	- 12:00	p.m.	**Group Photograph**	

Thursday, July 20:

7:00 a.m. - 8:00 a.m.	**Breakfast** (On your own)	
8:00 a.m. - 10:00 a.m.	**Lunar Certification** Mr. Randy Hunt	**Franklin Room**
10:00 a.m. - 10:15 a.m.	**Break**	
10:15 a.m. - 12:00 p.m.	**Math Olympics** Ms. Mildred Gilbert	**Franklin Room**
12:00 p.m. - 1:00 p.m.	**Lunch** (On your own)	
1:00 p.m. - 3:15 p.m.	**Technology** Ms. Octavia Tripp	**Franklin Room**
3:15 p.m. - 3:30 p.m.	**Break**	
3:30 p.m. - 5:00 p.m.	**Work on Portfolios**	**Franklin Room**
5:00 p.m. - 7:00 p.m.	**Dinner** (On your own)	
7:00 p.m. - 9:00 p.m.	**B.Y.O.A.** Ms. Octavia Tripp	**Franklin Room**

Friday, July 21:

7:00 a.m. - 8:00 a.m.	**Breakfast** (On your own)	
8:00 a.m. - 10:00 a.m.	**True Colors; South-East Consortium for Minority Engineers (SECME)** Ms. Brenda Simmons Program Coordinator	**Franklin Room**
10:00 a.m. - 10:15 a.m.	**Break**	
10:15 p.m. - 12:00 p.m.	**True Colors; South-East Consortium for Minority Engineers (SECME)** cont'd	**Franklin Room**
12:00 p.m. - 1:00 p.m.	**Lunch** (On your own)	

10:30	a.m.	- 11:15	a.m.	**SD-Landing and Impact Dynamics Branch** Mr. John Tanner	
11:15	a.m.	- 12:00	p.m.	**FD-Aerospace Models Section** Mr. Howard Wilson	
12:00	p.m.	- 1:00	p.m.	**Lunch - LaRC Cafeteria** (On your own)	
1:00	p.m.	- 2:00	p.m.	**Leave Langley Research Center** Destination: Virginia Air & Space Center (VASC)	
2:00	p.m.	- 5:00	p.m.	**Hot Air Balloons** UCEP Team	
5:00	p.m.	- 5:30	p.m.	**Leave VASC** Destination: Marriott Hotel	
5:30	p.m.	- 7:00	p.m.	**Dinner** (On your own)	
7:00	p.m.			**Project/Portfolio Work**	**Franklin Room**

Saturday, July 15:

7:30	a.m.	- 10:00	a.m.	**Leave Marriott Hotel** Destination: Kitty Hawk, North Carolina Wright Brothers Memorial (Stop will be made for breakfast)	
10:00	a.m.	- 12:00	p.m.	**Tour: Wright Brothers Memorial**	
12:00	p.m.	- 1:00	p.m.	**Lunch** (On your own)	
1:00	p.m.	- 3:00	p.m.	**Tour: Wright Brothers Memorial - cont'd**	
3:00	p.m.	- 5:00	p.m.	**Leave Kitty Hawk, North Carolina** Destination: Marriott Hotel	
5:00	p.m.			**Open**	

Sunday, July 16:

Open

APPENDIX H

THE 1996 NASA UCEP CORE

WORKSHOP AGENDA

UCEP Core Teacher Workshop #1
October/November 1996
Tulsa and Wichita

Today's topics: Planning & Aeronautics

Welcome/Introductions	Dr. Joe Martel, UCEP Coordinator NASA Headquarters	8:30 - 8:45
Warm Up Activity "All Tied Up"	Mr. Randy Hunt, UCEP team Aerospace Education Specialist	8:45 - 9:15
Aerospace Fair	Dr. Joe Martel, UCEP Coordinator NASA Headquarters	9:15 - 9:30
Review Teacher Packets	Ms. Octavia Tripp, UCEP Team Aerospace Education Specialist	9:30 - 9:45
Mini-Lecture/Demonstration	Mr. Hector Vasquez, UCEP team Aerospace Education Specialist	9:45 - 10:15
BREAK	ALL	10:15 - 10:30
Teacher planning forms	ALL	10:30 - 11:30
LUNCH	ALL	11:30 - 1:30
Pre Test Paper Airplane	Mrs. Gloria Clarke, UCEP Team Aerospace Education Specialist	1:30 - 1:45
Four Principles of Flight Mini-Lecture	Mr. Randy Hunt, UCEP Team Aerospace Education Specialist	1:45 - 2:15
Activities	Bernoulli Blower (Randy) Wing on a string (Hector) Rotor promoter Soaring cylinder (Octavia)	2:15 - 3:00
Post Test "Airplane Contest"	ALL	3:00 - 3:10
Closing/Questions	Dr. Joe Martel, UCEP Coordinator NASA Headquarters	3:10 - 3:30

UCEP Core Teacher Workshop #2
October/November 1996
Tulsa and Wichita

Today's Topic: Rocketry

Welcome/Announcements	Octavia	8:00 - 8:15
Warm Up Activity "Sponge Art"	Randy	8:15 - 9:00
Principles of Rocketry Mini-Lecture	Octavia	9:00 - 9:45
Activities	Pop Fizz (Randy) Straw Rocket (Hector) Rocket Car (Joe) Rocket Balloon (Octavia)	9:45 - 10:30
BREAK	ALL	10:30 - 10:45
Activities (Continued)		10:45 - 12:30
Lunch Break	ALL	12:30 - 1:30
Post Test	Hector	1:30 - 2:00
Journal Entry (Wan Hu Story)		
Closing/Questions	Randy	2:00 - 2:30

UCEP Core Teacher Workshop #3
October/November 1996
Tulsa and Wichita

Today's Topics: Astronomy and Technology

Greetings from NASA Headquarters		Richard Adams	8:45 - 9:00
Warm Up Activity	Family in the Sun Solar System Pneumonic	Octavia	9:00- 9:30
Pre-Test	Getting to the Know the Universe	Octavia	9:30 - 9:45
Mini-Lecture	Astronomy	Gloria	9:45 - 10:15
Break		ALL	10:15 - 10:30
Activities:	Images from Space Lunar Certification	Octavia Randy	10:30 - 12:00
Lunch Break		ALL	12:00 - 1:00
Mini-Lecture	NASA Technology	Gloria	1:00 - 1:45
Activities	Netscape NASA Spacelink	ALL	1:45 - 2:45
Post Test	Journal Entry (Powers of Ten)	Hector	2:45 - 3:10
Closing/Questions		Octavia	3:10 - 3:15

UCEP Core Teacher Workshop #4
October/November 1996 (tenative)
Tulsa and Wichita

Today's Topics: Life Science & Microgravity/Evaluation

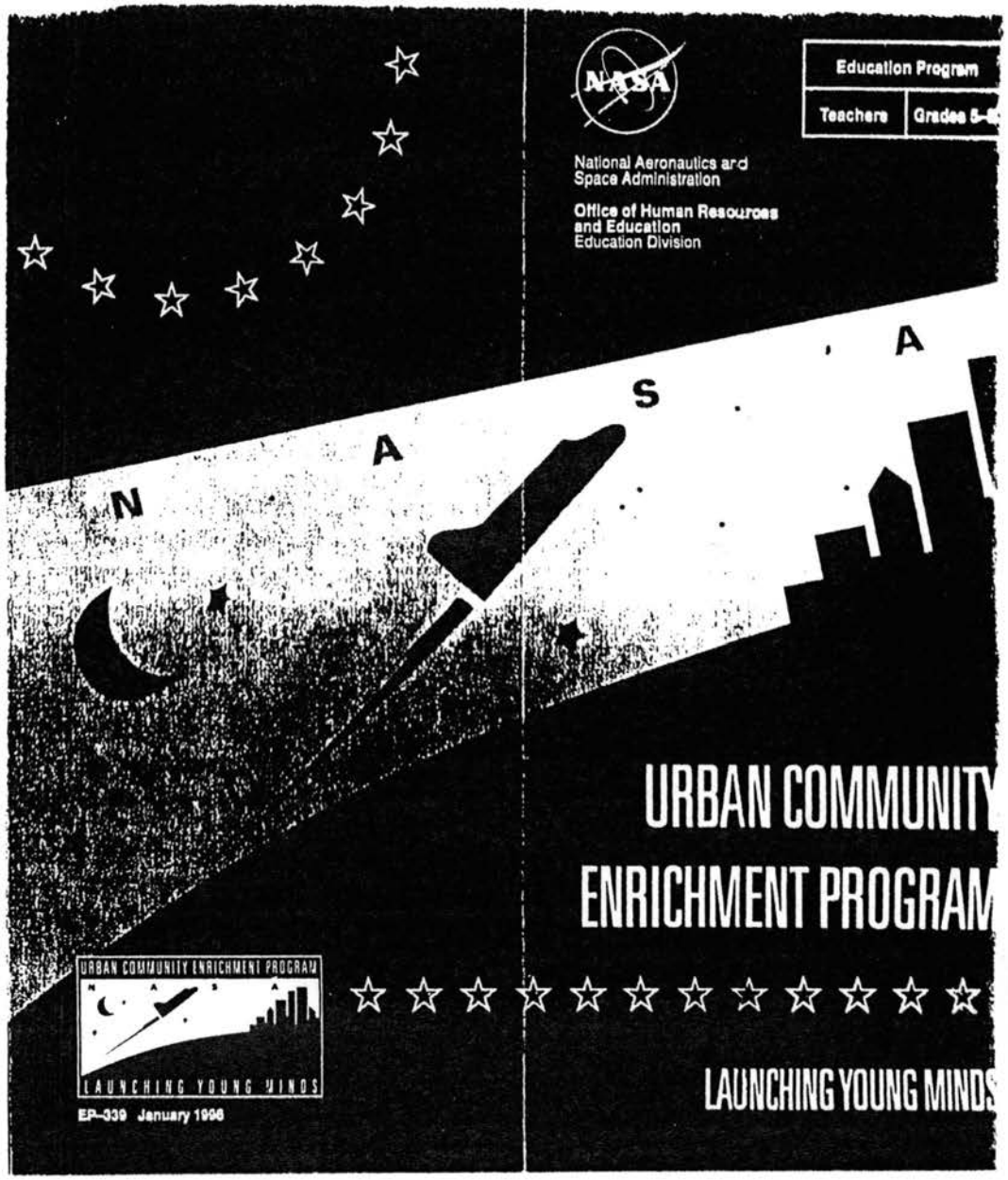
Welcome		Joe Martel	8:45 - 9:00
Warm Up Activity	Aerospace Aerobics	Octavia	9:00 - 9:30
Pre-Test	KWL	Gloria	9:30 - 10:00
Mini-Lecture	Astronaut Selection and Training	Gloria	10:00 - 10:30
Break		ALL	10:30 - 10:45
Activities	Lung Model Cooling Garment Reaction Time Weightless Cup Post Test	Octavia Randy Randy Joe Hector	10:45 - 12:00
Lunch Break		ALL	12:00 - 12:45
Workshop Evaluation		Joe Martel	1: 00 - 2:00
Awards/Presentations		Randy	2:00 - 2:30
Closing/Questions		Joe Martel	2:30 - 3:00

APPENDIX I

NASA UCEP OVERVIEW BROCHURE

Interested school systems may obtain additional information by writing to:

NASA Headquarters
Education Division
Attn: UCEP Program Manager
Code FE
Washington, DC 20546



The **NASA Urban Community Enrichment Program** (UCEP) is a NASA Aerospace Education Services Program specifically designed to serve middle school students in urban areas.

This three-day program is planned, coordinated, and implemented in participating schools by the UCEP team. Major activities include lectures, demonstrations, and structured classroom activities highlighting the various sciences that supplement the ongoing curriculum. In addition, workshops and other activities are offered to school personnel.

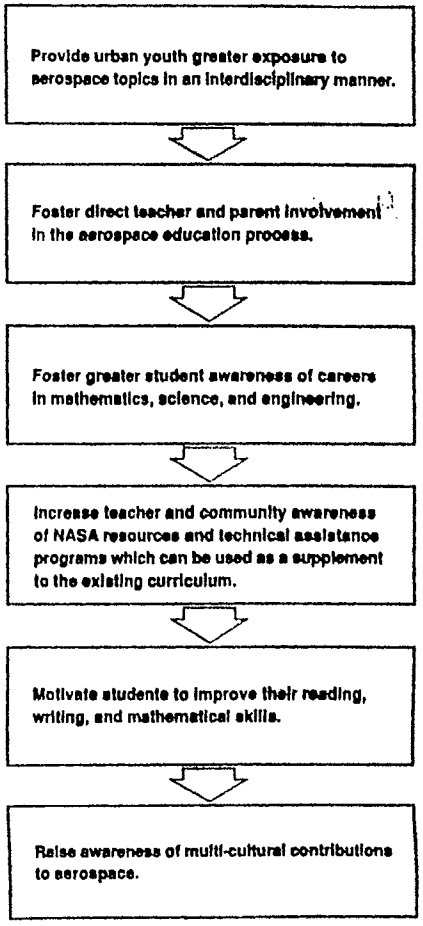
The program exposes teachers and middle school students from urban communities to interesting and broadening educational activities. Special emphasis is placed on communications, logic, and reasoning skills that are curriculum related. Technical and logistical assistance is supplied by the NASA UCEP coordinator.

The program's involvement in the nation's schools has been extensive. Since 1981, a total of 39 systems, 704 schools, 1,348 administrators, 5,582 teachers, and 529,603 students from urban areas have benefited from UCEP activities.

In preparation for the three-day program, NASA Aerospace Education Specialists train core teachers as a team to conduct interdisciplinary aerospace activities in school districts. Superintendents, with suggestions from principals, are asked to select core teachers from schools in their districts. The core teachers devote eight weeks to working with the aerospace program in their schools where they lead interdisciplinary teams of teachers in interactions with the principal and faculty. They also ensure that all preparations are made for implementing the aerospace programs.

The teams of teachers that work with the core teachers are selected by the principals of the participating schools. They must represent different disciplines in the school such as mathematics, science, physical education, social studies, fine arts, and language arts. The number of teachers participating on a team is unrestricted.

The goals of UCEP are to...



APPENDIX J

NASA UCEP SUMMER ENHANCEMENT

WORKSHOP APPLICATION

D. Teaching Experience

List school(s), teaching assignments, dates, and other information which provides an accurate portrayal of your teaching experience.

Essay Questions (maximum one page per question)

A. Describe how you, in your current teaching assignment, incorporate new ideas and concepts; integrate related disciplines; connect classroom studies to real world application; and promote educational excellence in your school and community.

B. Describe the particular needs of your student body or school regarding educational resources and innovative or motivational approaches.

C. Outline and describe a plan for using the knowledge and resources you will receive during the workshop with your students, school, and/or community. After returning to your district, we will expect you to develop this plan into a unit to be presented in an educational setting, and to share this unit with our organization.

Letters of Support

Attach three letters of support. One letter from an administrator should indicate the willingness of the school, the district, or an educational organization to provide you with an opportunity to share the information and materials gained at the NASA workshop with other teachers. The other two letters should be from individuals familiar with your teaching skills, and contain specific evidence of your ability to motivate students and promote educational excellence.

Program Benefits

Selected applicants will receive:

- A two-week workshop with a tour of a NASA center
- Travel expenses, housing, and meals
- A stipend of $500
- Three graduate credit hours from Oklahoma State University
- NASA educational materials and publications

What is a successful teacher profile?

- Demonstration of continuous growth and professional involvement in an area(s) of specialization and in the art of teaching
- Improvement of students' understanding of science, mathematics, and technology
- Successful experience reaching students who need additional educational resources, or innovative approaches and intervention strategies for learning

EP-1997-10-325-HQ

Educational Program	
Teachers	Grades 5–8

National Aeronautics and Space Administration

Office of Human Resources and Education
Education Division

Urban Community Enrichment Program

UCEP Teacher Workshop in Science, Mathematics, and Technology

1998 NASA/UCEP Application Form

Applicant's Name:

Home Address:

City: State:

Zip Code:

Social Security Number:

School Name and Address:

Phone

Office:

Residence:

E-Mail Address:

Teacher Workshop: July 5–18, 1998

Please mail or fax this application to:

Oklahoma State University
UCEP Coordinator
Suite 220
500 E Street, S.W.
Washington, DC 20024-2760
Phone (202) 554-4380 ■ FAX: (202) 554-5378

DEADLINE: February 15, 1998

Urban Community Enrichment Program

What is a UCEP Workshop?

The National Aeronautics and Space Administration offers UCEP as a professional development opportunity for educators teaching grades 5–8. The program consists of hands-on science, mathematics, and technology activities. Teachers interact with aerospace specialists, engineers, scientists, and technicians and discuss current space and aeronautical discoveries.

What happens during the workshop?

- Science, mathematics, and technology integration
- Aerospace concepts integration into the curriculum
- Activity-based lessons (hands-on)
- Cooperative learning strategies
- Leadership skills development
- Active learner participation in a supportive, stimulating environment
- Additional travel to relevant aerospace facilities, organizations, and NASA Centers

The Urban Community Enrichment Program

Science, Mathematics, and Technology

Summer Teacher Workshop held at

Oklahoma State University,

Stillwater, Oklahoma

July 5–18, 1998

Eligibility

- Must be a citizen of the United States
- Must be a certified teacher (in grades 5–8)
- Must teach full time in public or private schools in the United States, the U.S. territories, Department of Defense schools, Department of State overseas schools, or Bureau of Indian Affairs schools
- No previous participants (however, previous applicants not selected may reapply)
- Workshop strictly for selected participants

Please respond to the following questions on a separate sheet of paper. Responses must be typed, double-spaced, on unlined 8 1/2 in. x 11 in. paper, one side only.

Academic and Professional Experience

Summarize your professional background and experience as outlined below. Do not exceed two pages. You may attach a professional résumé.

A. Current teaching assignment

Describe your current teaching assignment in detail, listing courses and other related duties. Account for 100% of your time.

B. Formal Education

Indicate institution name(s), type of degree, major, and minor.

C. Certification

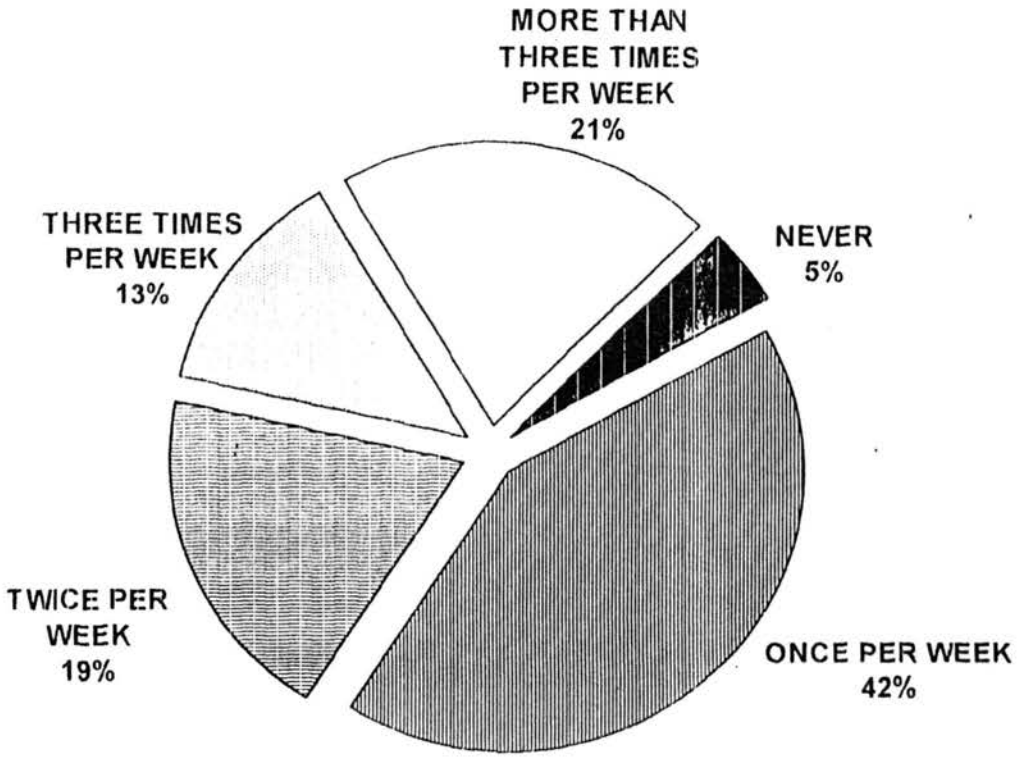
Specify the type of certification you hold.

APPENDIX K

CHARTS

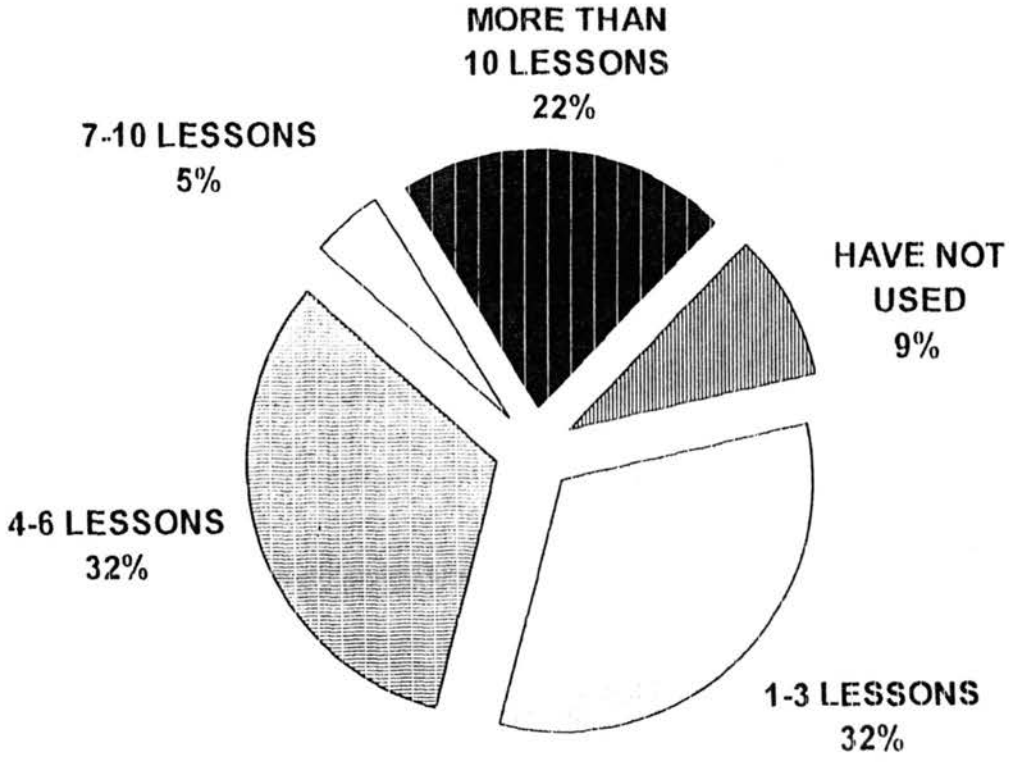
The Impact of NASA's Urban Community Enrichment Program Enhancement Workshops on Classroom Instruction

USAGE OF HAND-ON ACTIVITIES PRIOR TO ATTENDING UCEP WORKSHOPS



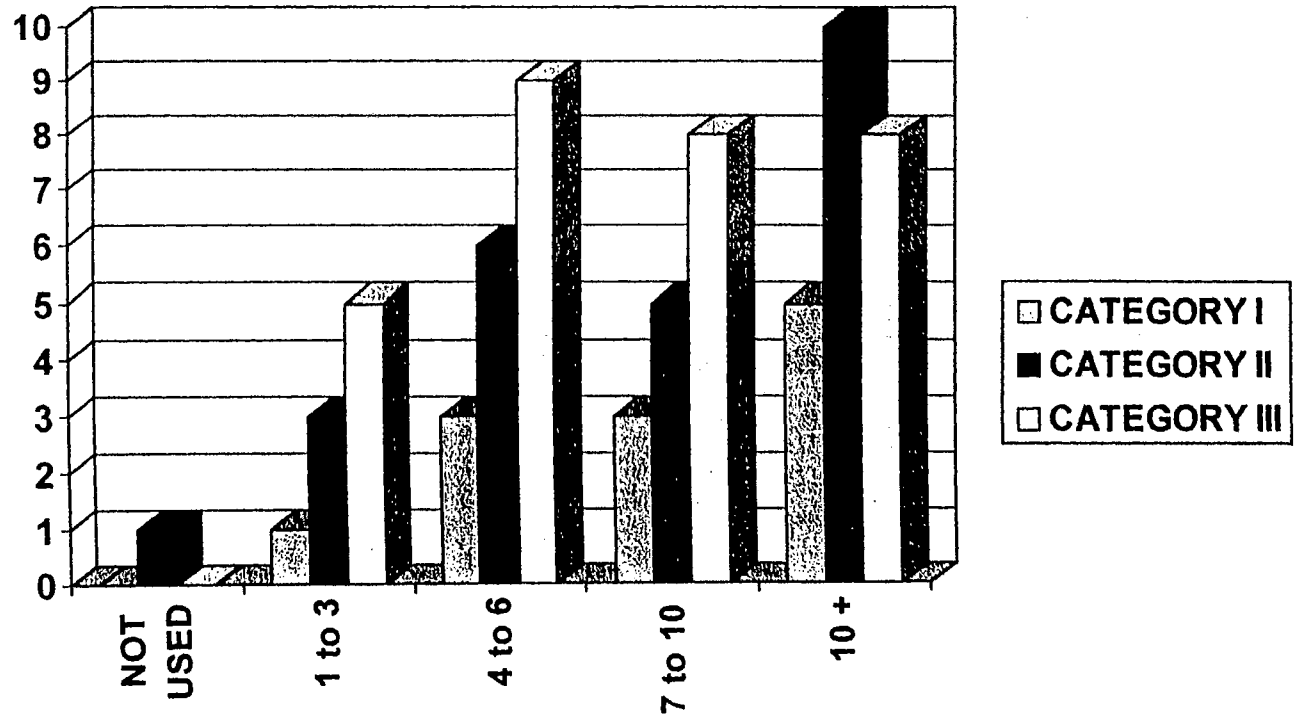
The Impact of NASA's Urban Community Enrichment Program Enhancement Workshops on Classroom Instruction

THE INCORPORATION OF NASA CURRICULUM PRODUCTS



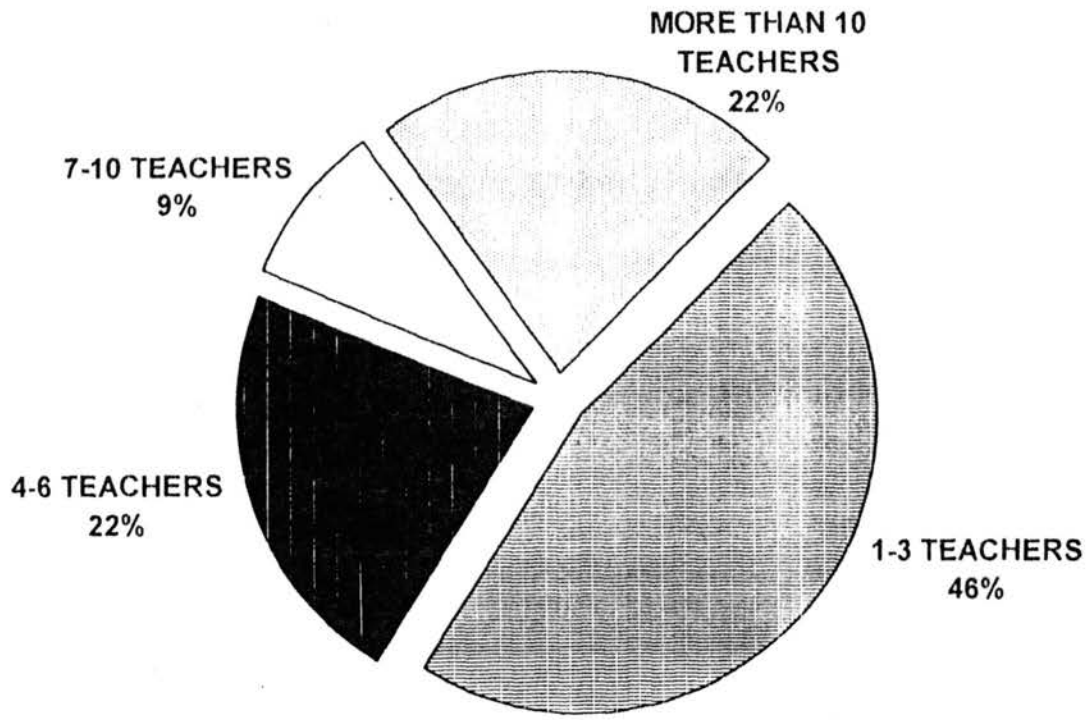
The Impact of NASA's Urban Community Enrichment Program Enhancement Workshops on Classroom Instruction

Chi-square Values Reflecting Relationship Between Category I, II, and III & Incorporation of NASA Curriculum Products



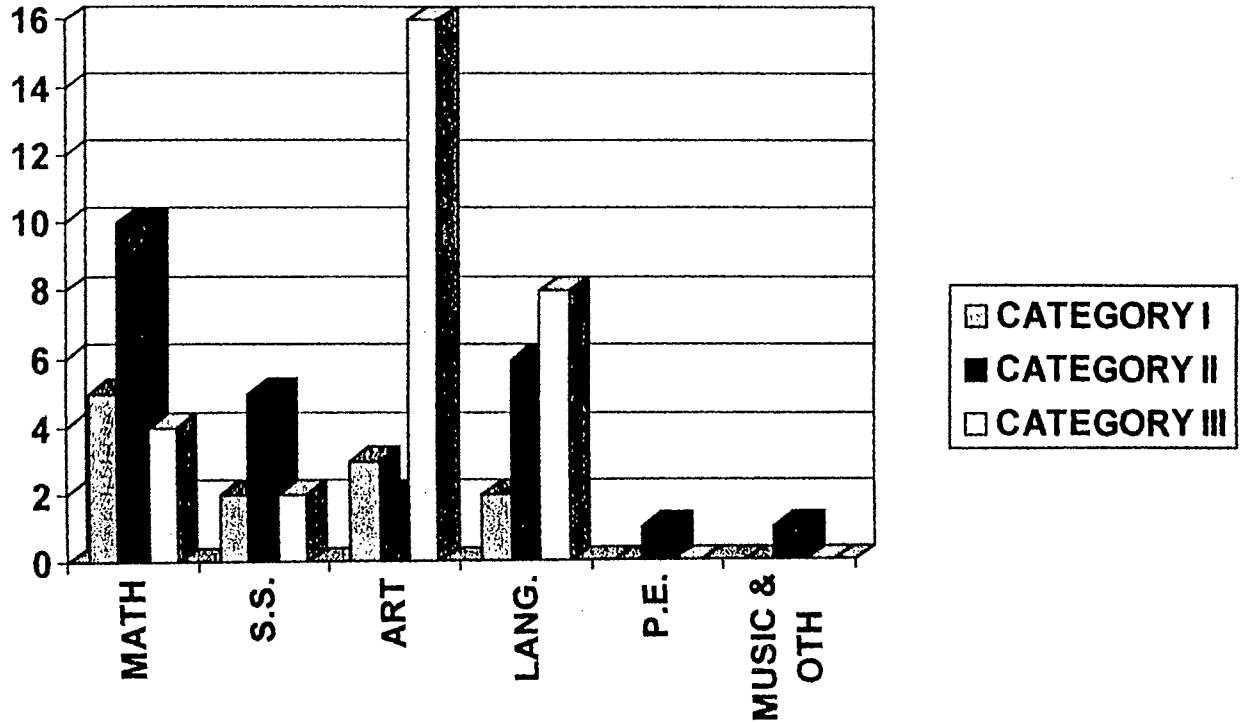
The Impact of NASA's Urban Community Enrichment Program Enhancement Workshops on Classroom Instruction

SHARING OF UCEP WORKSHOP MATERIALS WITH OTHERS



The Impact of NASA's Urban Community Enrichment Program Enhancement Workshops on Classroom Instruction

Chi-Square Values Reflecting Relationship Between Category I, II, and III & Planning and Preparing Interdisciplinary Lessons



VITA

Lucretia Octavia Tripp

Candidate for the Degree of

Doctor of Education

Thesis: THE IMPACT OF NASA'S URBAN COMMUNITY ENRICHMENT PROGRAM ENHANCEMENT WORKSHOPS ON CLASSROOM INSTRUCTION

Major Field: Applied Educational Studies

Biographical:

Personal Data: Born in Macon, Georgia, February 4, 1954, the daughter of Augustus Tripp and Lillian Tripp Collins.

Education: Graduated from Lassiter High School, Macon, Georgia in 1971; received Bachelor of Arts degree form Wesleyan College, Macon, Georgia, with a major in Middle Grades Education in May, 1980; received Master of Science degree from Oklahoma State University, Stillwater, Oklahoma, with a major in Natural and Applied Science in May 1995. Completed requirements for the Doctor of Education degree at Oklahoma State University in May, 1998.

Professional Experience: Elementary teacher of general science, grades 5-6, Springdale Elementary, 1980-83; Earth science teacher, grade 8, Miller A Middle School, 1983-84; general science teacher, grades 4-5, Heard Mixon Elementary School, Covington, Georgia, 1984-86; Life science teacher, grade 7, Glendale Elementary, Dekalb county, Georgia, 1986-87; Earth Science teacher, grade 8, Symrna, Georgia, 1987-91; Aerospace Education Specialist, Oklahoma State University, Stillwater, Oklahoma, 1991 to present.

Professional Memberships: National Science Teacher's Association. National Council of Mathematics Teachers, International Technology Education Association, National Alliance of Black School Educators, and Georgia Middle School Association.

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Date of Degree: May, 1998

Institution: Oklahoma State University

Location: Stillwater, Oklahoma

Title of Study: THE IMPACT OF NASA'S URBAN COMMUNITY ENRICHMENT PROGRAM ENHANCEMENT WORKSHOPS ON CLASSROOM INSTRUCTION

Pages in Study: 121

Candidate for the Degree of Doctor Of Education

Major Field: Applied Educational Studies

Scope and Method of Study: The purpose of this study was to determine if NASA UCEP teacher enhancement workshop participants utilize hands-on activities, curriculum instruction, resources, and integration of aerospace concepts, and if the impact on their classroom instruction varies after attending only the UCEP summer enhancement workshop, the core workshop, or both the summer and core workshops. The subjects of this study consisted of 140 UCEP participants from 1994 to 1996. Data from the workshop's participants were obtained by use of a survey. Research questions were then used to determine the utilization of hands-on activities, curriculum instruction, resources, and integration of aerospace concepts by workshop participants. Descriptive statistics were used to report the responses to the survey. Frequencies and percentages were reported for analysis of data. Chi-square tests were conducted to test for any differences.

Findings and conclusions: Overall classroom instruction has been impacted by the use of materials acquired by the UCEP participants who have attended both the core workshop and the summer enhancement workshop. The UCEP participants are sharing their experiences and knowledge with others and they are planning and preparing more interdisciplinary lessons. Also, teachers who have attended both the core workshop and summer enhancement workshop have used curriculum materials in more lessons a year. Finally UCEP workshop participants have made positive responses finding the workshops to be very effective.

ADVISER'S APPROVAL